

N-TP

Z50 New Model Introduction

January 2006



Z50 NISSAN MURANO



Foreward

The information in this Training Manual should not be interpreted as a basis for warranty or goodwill claims against Nissan Motor Co. (Australia) Pty. Ltd. (NMA) unless so designated.

This Technical Training Manual is intended for use by NMA & Nissan Dealership Technical Personnel. It is not designed for the use by press or for customer distribution.

Before quoting any specifications be sure to check the relevant Service Manual and Technical Bulletins.

Right for alteration to data and specifications at any time is reserved. Any such alterations will be advised by Nissan through Technical and Sales Bulletins.

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Ref: Technical Training Department.



ABOUT THIS TRAINING MANUAL

The purpose of this document is for Nissan Dealer Technical Staff SELF STUDY purposes. If anything contained within this document gives any doubt, please contact Nissan via a Non Vehicle related TechLine enquiry to clarify the information within this document.

The information in this training manual should not be interpreted as a basis for warranty or goodwill claims against Nissan Motor Co. (Australia) Pty. Ltd. (NMA) unless so designated.

FUTURE UPDATE'S OF THIS TRAINING MANUAL?

Additional information will be collated & added to this document at a later date. When this does occur, a special amendment document will be published on iNISC.COM. Click on "Training Manual" on the Service Homepage in iNISC.COM. This actual Training Manual will also be readily available at anytime for download & printing within each Nissan Dealership.

Z50 SERVICE MANUAL (ESM)

SM5E-1Z50G2

Your dealership service department will have access to a Service Manual (ESM) for Z50 in early August 2005. If not, please contact TechLine via a non vehicle related enquiry.

This Training Manual is designed for the purpose of relaying information about the vehicle & the systems within it.

This Training Manual is NOT to be used as the Service Manual. Throughout this Training Manual, references are made to the Service Manual for additional information regarding fault diagnosis, repairs &/or maintenance.

Once again should there be any doubt, please contact TechLine.

Z50 SERVICE TECHNICAL BULLETINS (STB's current as at Jan '06)

Please ensure you familiarise yourselves with the following STB's relating to Z50;

- GI 05-007 - Safety Warnings (in relation to Xenon lights)
- GI 05-011 - Z50 Model Introduction Information
- GI 05-012 - SST - Special Service Tools
- BF06-002 - Tow Bar Wiring Harness



2005 Z50 Murano Overview

The all-new 2005 Murano represents Nissan's first entry into the rapidly expanding crossover SUV segment. Murano features dramatic styling and advanced technology, including an EXTRONIC CVT (Continuously Variable Transmission).

Murano shares its FF-L (front-engine, front-drive) platform with J31 Maxima and is equipped with an All Wheel Drive system (AWD).

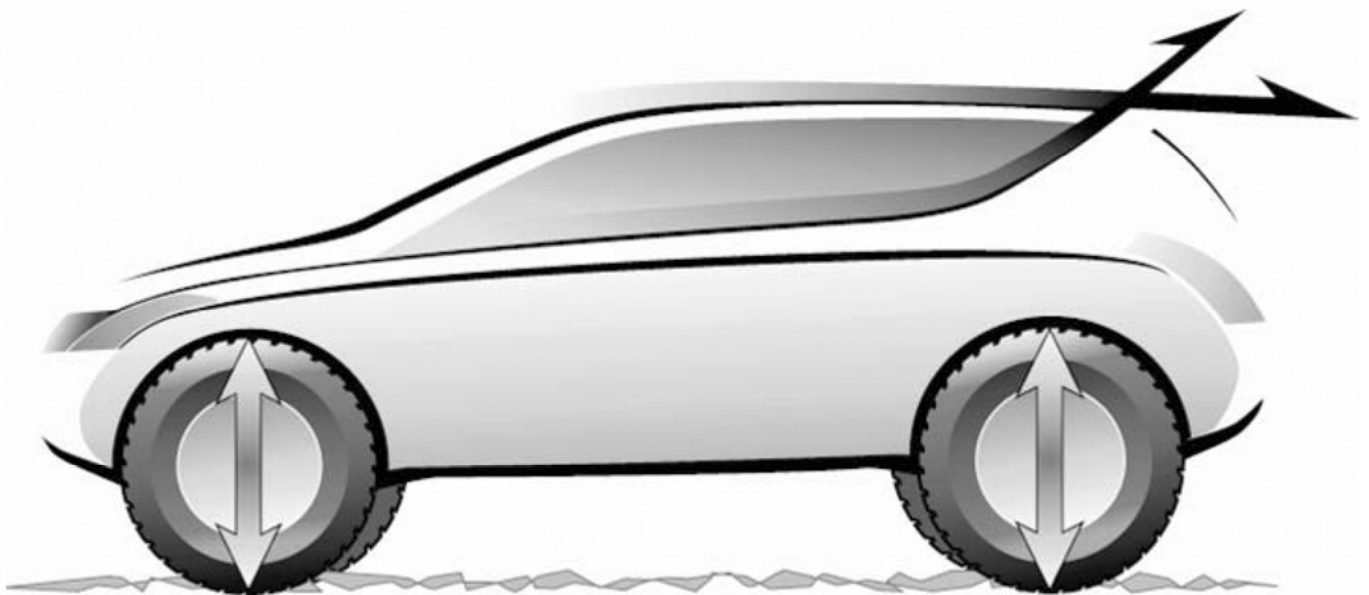
Advanced safety technologies include roof-mounted supplemental Curtain Air Bags for side impact protection to outboard passengers front & rear as well as Side Airbags in both front seats, Dual Front Passenger Airbags & Front Passenger Seatbelt Pre-Tensioners.

Other features for Murano include Xenon Headlamps & VDC which are standard fitment to all variants.

Spec Levels, Features & Capacities

Reference should be made to the most current New Vehicle Sales brochure in order to determine the most current Specification Levels & features.

The brochure will also contain information regarding Weights, Dimensions & Capacities.





A – GENERAL INFORMATION

PRECAUTIONS

1. All Mode AWD System

It is NOT possible to select 2WD mode. Therefore it is possible for the All Mode AWD system to automatically engage itself.

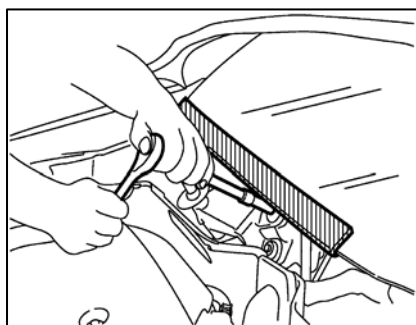
PLEASE EXERCISE EXTREME CAUTION WHEN WORKING ON A VEHICLE WITH ONLY 2 WHEELS LIFTED OFF THE GROUND.

2. Xenon Headlamp Safety Precautions

Extreme caution must be observed when working with the Xenon type Headlamps. Please refer to STB GI 05 -007 for more detail.

3. Precautions for Procedures without Cowl Top Cover

When performing the procedure after removing cowl top cover, suitably protect the lower end of windshield with urethane, etc.



BEWARE;

Take extreme caution when working in the region of the windscreen as shown left.

The windscreen can be easily broken if the appropriate cautions are not taken.

4. Other General Precautions

Please make yourself aware of general safety & vehicle handling precautions outlined in section A – GI of the Service Manual.



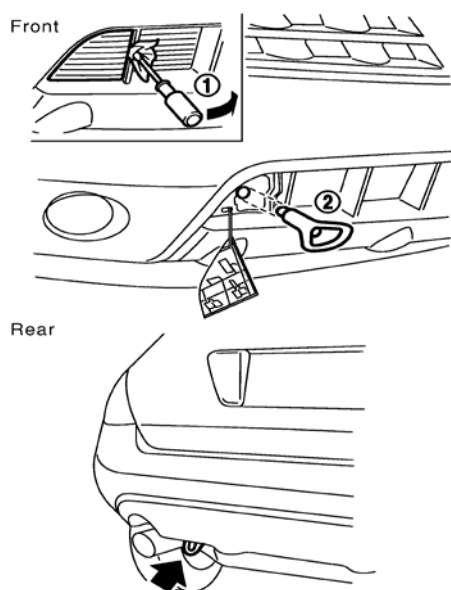
A – GENERAL INFORMATION

VEHICLE HANDLING.

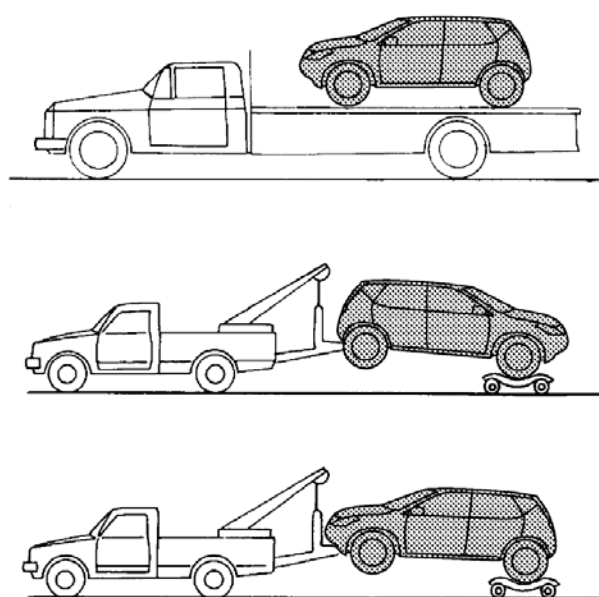
1. Towing

Please refer to section A – GI of the Service Manual for detailed instructions regarding Towing of the vehicle.

The tow hook should be used with extreme caution. Vehicle towing **MUST** be carried out with **ALL** wheels raised of the ground.



Short Distance & Emergency use only



Recommended Methods



The above shows the vehicle transporter tie down points. Please ensure that if the vehicle is to be taken from your dealership on a vehicle transporter that these points are used.

DO NOT secure the vehicle to a transporter by attaching ropes / chains to any of the suspension components or the towing hooks etc.

A – GENERAL INFORMATION

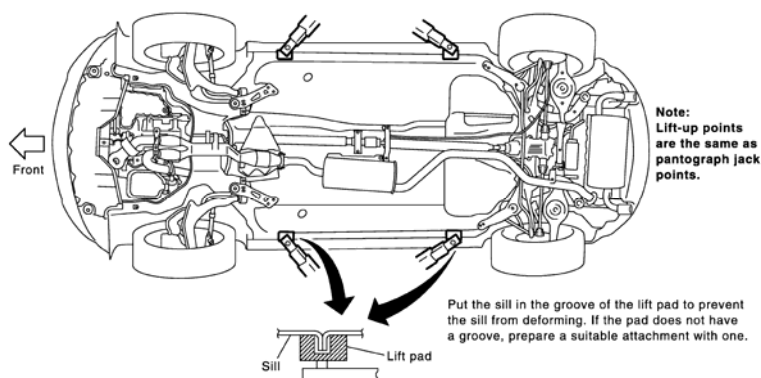
VEHICLE HANDLING

2. Lifting

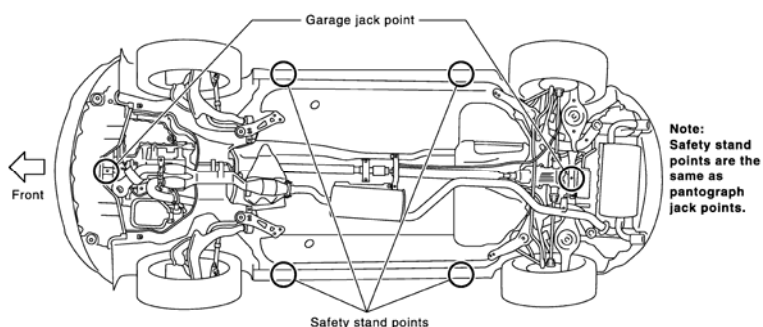
Please refer to section A – GI of the Service Manual for detailed instructions regarding Lifting of the vehicle.

In order to avoid serious vehicle damage, please observe these precautions.

2 Post Hoist lift points

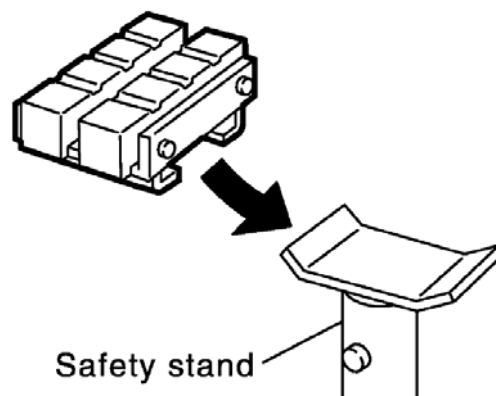


Garage Jack & Safety Stands Lift Points



Pantograph Jack Lift Points

Use the points that are indicated for the safety stands.

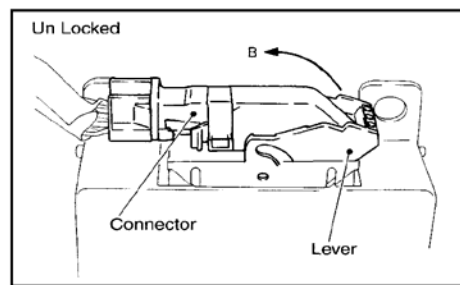
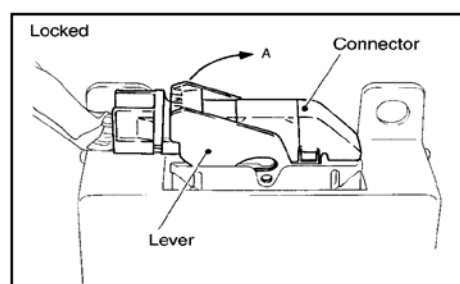
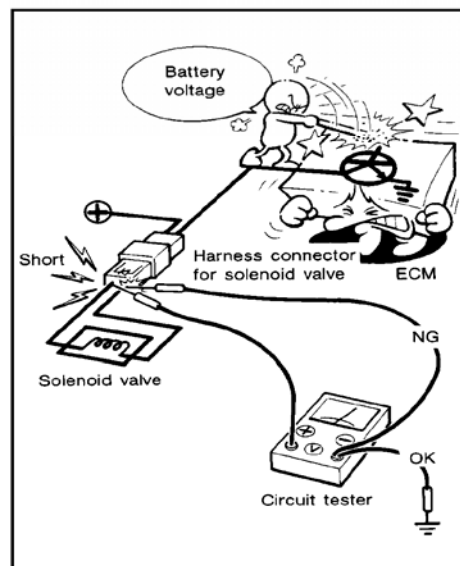


A – GENERAL INFORMATION

HANDLING OF ELECTRICAL COMPONENTS

Control Units and other Electrical Parts

- Disconnect Battery prior to Disconnection & Connection of ECM.
Never reverse polarity of battery terminals.
- Install only parts specified for the vehicle in question.
- **Before replacing the control unit**, check the input and output and functions of the components.
- Do not shock the control unit by dropping or hitting it.
- Be careful to prevent condensation in the control unit due to rapid temperature changes and do not let water get on it.
- Do not let oil to get on the control unit connector.
- Do not disassemble the control unit.
- When using a Digital Multi Meter (DMM), be careful not to let test probes touch each other. Short circuiting will otherwise result.
- Do not apply excessive force when disconnecting a connector.
- If a connector is installed by tightening bolts, loosen bolt mounting it, then take it out by hand.
- When installing a connector by tightening bolts, fix it by tightening the mounting bolt until the painted projection of the connector becomes even with the surface.
- Before installing a connector, make sure the terminal is not bent or damaged, and then correctly connect it.
- For removal of the lever type connector, pull the lever up to the direction pointed to by the arrow A in the figure, and then remove the connector.
- For installation of the lever type connector, pull down the lever to the direction pointed by the arrow B in the figure, and then push the connector until a clicking noise is heard.



A – GENERAL INFORMATION

CONSULT II APPLICATION

1. Equipment

Whenever CONSULT II is used to access systems on Z50, the CONSULT II unit **MUST** be used in conjunction with the Converter Unit.

NEVER USE CONSULT II ON A Z50 MODEL WITHOUT THE CONVERTOR UNIT.

1. CONSULT II unit.

2. Software Card

Diagnosis: **AED 05D**

NATS: **AEN 04A-1**

A new CD-R was supplied in January 2006 which contains AED05D software only. Refer to STB GI 06-001 & GI 05-002a.

The AEN04A-1 NATS software can be found on a CD issued in July 2005. Refer to STB GI 05-002a.

3. Converter Unit.

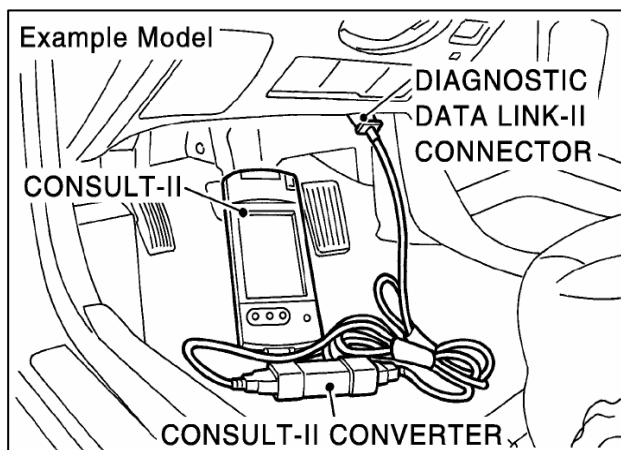
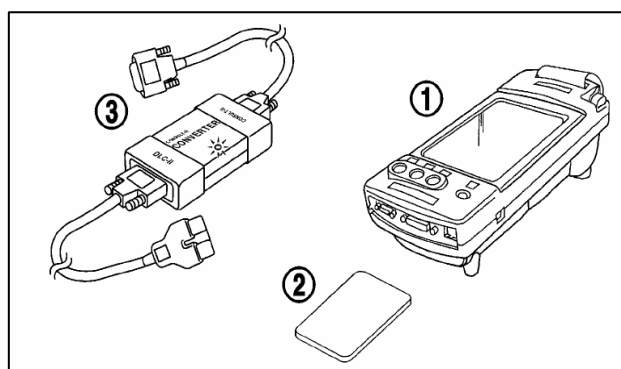
Whenever Consult II is connected to the Z50, always use the converter unit.

Failure to connecting CONSULT II without the Converter Unit will cause the CAN System to go into a failsafe condition.

The following occurs in failsafe condition:

- Headlights lights come on
- Heater/Air Conditioner fan operates
- Air Conditioner magnetic clutch operates

See right for location of the DDL II link on the vehicle.





A – GENERAL INFORMATION

CONSULT II APPLICATION

2. Accessible Systems

The systems as shown right are accessible with CONSULT II.

Please ensure you are using the correct software prior to connection of CONSULT II to the vehicle.

To access all systems shown right (except NATS*1) use software version **AED05D**.

*1 To access NATS, use NATS software version **AEN04A-1**.

3. General Trouble Diagnosis

If the CONSULT-II cannot diagnose the system properly, check the following items in the table below:

| |
|---|
| ENGINE |
| ABS <small>*Including VDC</small> |
| AIR BAG |
| HEAD LAMP LEVELISER <small>*For the Xenon Lights</small> |
| ALL MODE AWD/4WD |
| BCM |
| IPDM E/R |
| METER A/C AMP |
| TRANSMISSION <small>*CVT Transmission</small> |
| NATS *1 |

| Symptom | Check item |
|--|---|
| CONSULT-II cannot access any system. | <ul style="list-style-type: none"> ● CONSULT-II DLC power supply circuit (Terminal 8) and ground circuit (Terminal 4) (For detailed circuit, refer to "MIL & Data Link Connectors Wiring Diagram" in EC section.) ● CONSULT-II DLC cable and CONSULT-II CONVERTER. |
| CONSULT-II cannot access individual system. (Other systems can be accessed.) | <ul style="list-style-type: none"> ● CONSULT-II program card (Check the appropriate CONSULT-II program card for the system. Refer to "Checking Equipment".) ● Power supply and ground circuit for the control unit of the system (For detailed circuit, refer to wiring diagram for each system.) ● Open or short circuit between the system and CONSULT-II DLC (For detailed circuit, refer to wiring diagram for each system.) ● Open or short circuit CAN communication. |

NOTE:

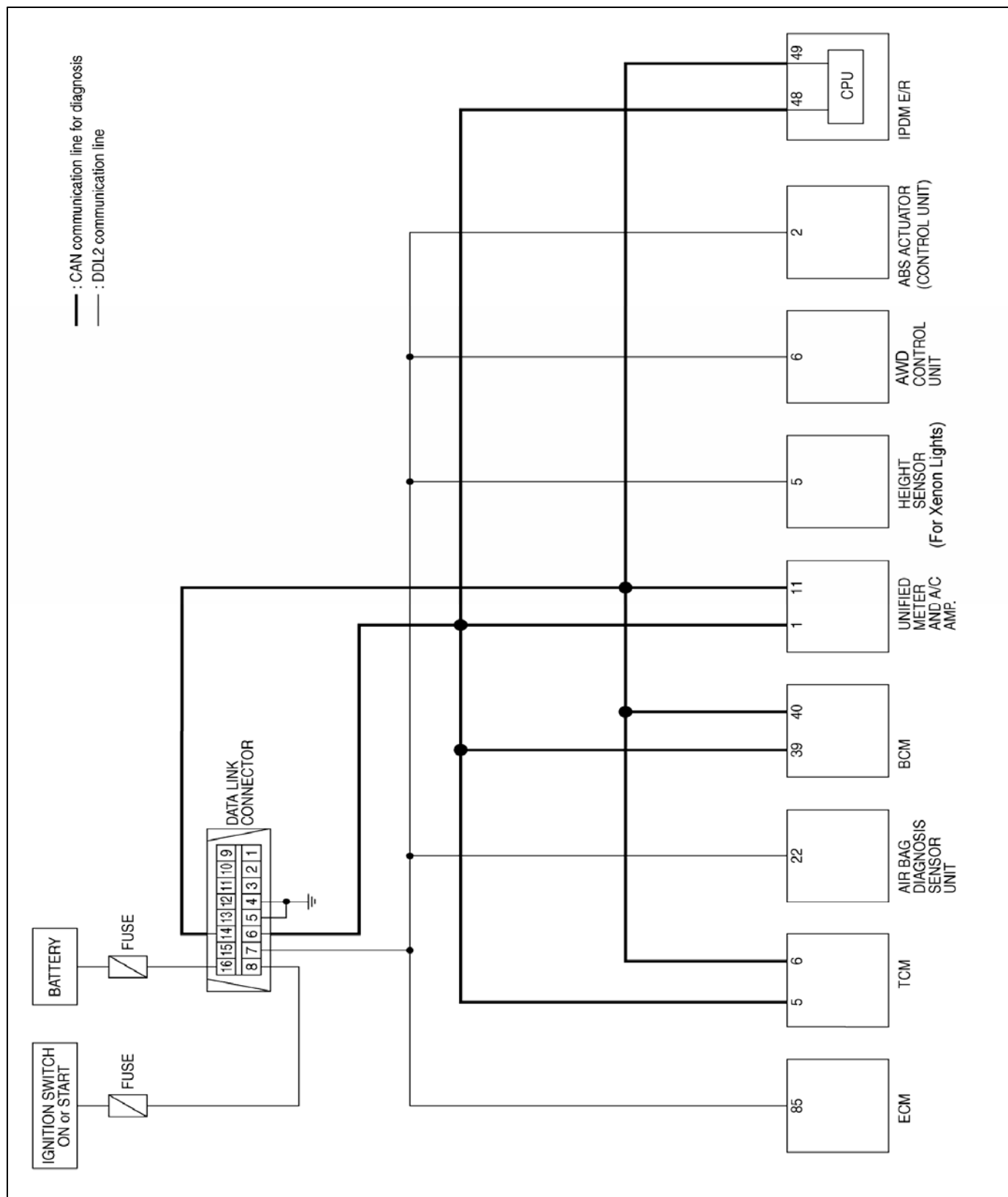
The DDL1 and DDL2 circuits from DLC pins 12, 13, 14 and 15 may be connected to more than one system. A short in a DDL circuit connected to a control unit in one system may affect CONSULT-II access to other systems.



A – GENERAL INFORMATION

CONSULT II APPLICATION

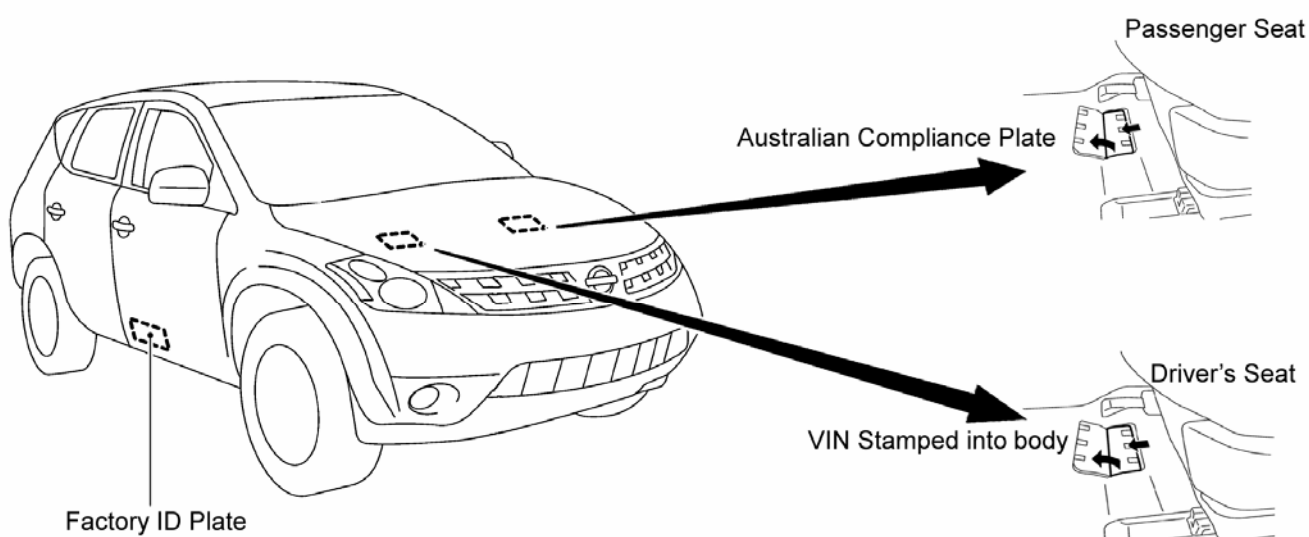
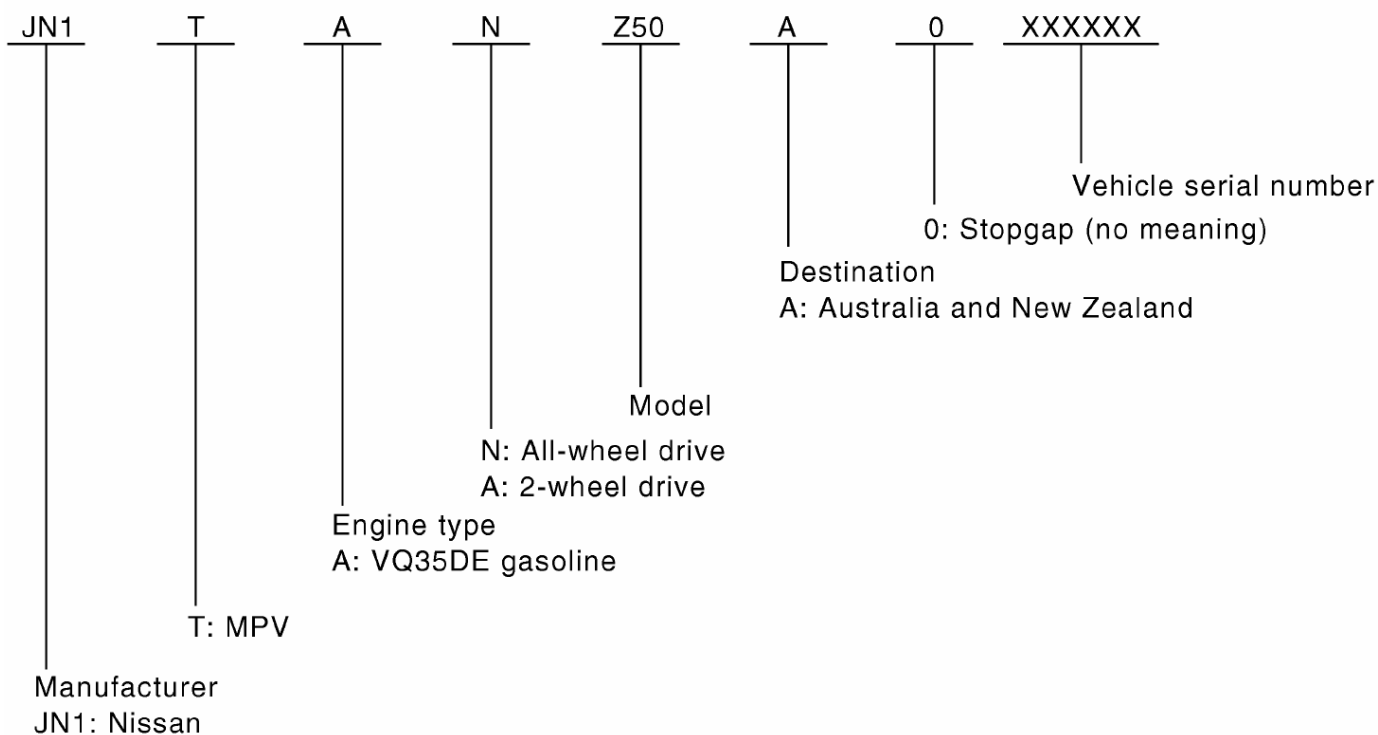
4. General System Wiring Diagram





A – GENERAL INFORMATION

VEHICLE IDENTIFICATION NUMBER ARRANGEMENT





B – ENGINE MECHANICAL

VQ35DE



The Z50 Murano is available with a Petrol V6 only. The VQ series of engines is utilised as the case with other models such as A32 & A33 (VQ30). J31 & Z33 like the Murano utilise the VQ35 & the more recent R51 & D40 utilise the VQ40.

The VQ35DE is basically the same engine as that found in J31 & Z33.



B – ENGINE MECHANICAL

VQ Series Engine Comparison Chart

| | Bore/Stroke | Main Journal Diameter | Pin Journal Diameter |
|------|---------------|-----------------------|----------------------|
| VQ30 | 93 x 73.3mm | 60mm | 45mm |
| VQ35 | 95.5 x 81.4mm | 60mm | 52mm |
| VQ40 | 95.5 x 92mm | 70mm | 54mm |

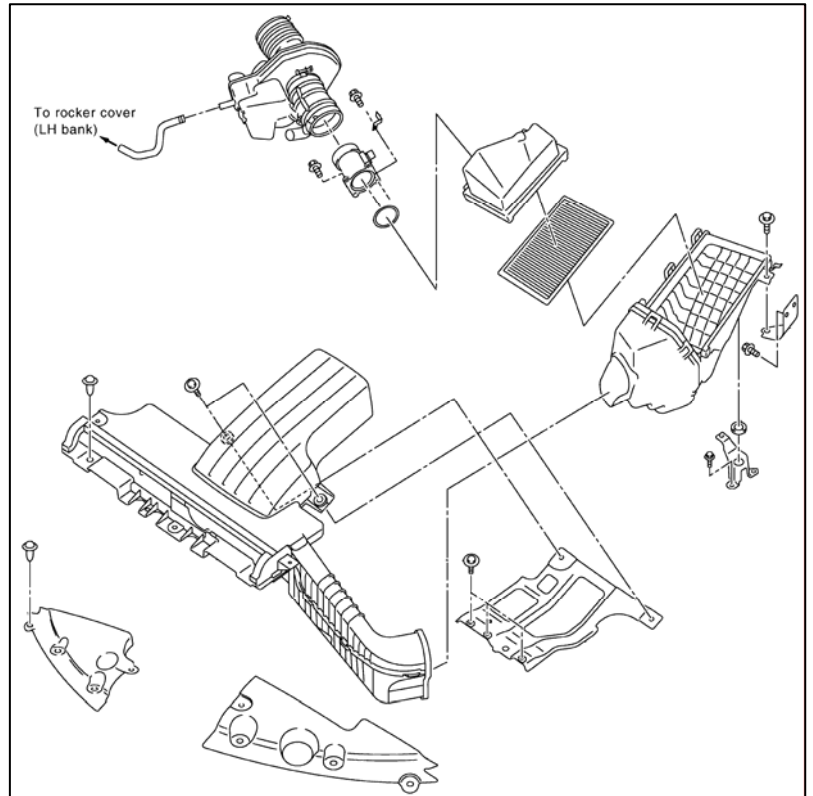
Z50 VQ35DE Technical Features

- Displacement (Litres); 3.5. Bore x Stroke (mm) 95.5 x 81.4
- Compression Ratio; 10.3:1
- Maximum Power (kW); 172 @ [6000] rpm. Maximum Torque (Nm) 318 @ [3600] rpm
- Maximum Engine Speed; 6600 rpm
- Sequential multi-point fuel injection
- Variable Intake Air System (VIAS)
- Electronic Throttle Control (ETC)
- Valve train DOHC 4-valves-per-cylinder with Continuously Variable Valve Timing Control (C-VTC)
- Silent type Timing Chain
- Micro finished Camshaft and Crankshaft surfaces with Molybdenum-coated pistons
- Platinum tipped Spark Plugs. 100,000km service intervals
- Minimum Fuel requirements; RON 95 Unleaded
- Engine Oil specification; 7.5 W30. 10,000km Service Interval

B – ENGINE MECHANICAL

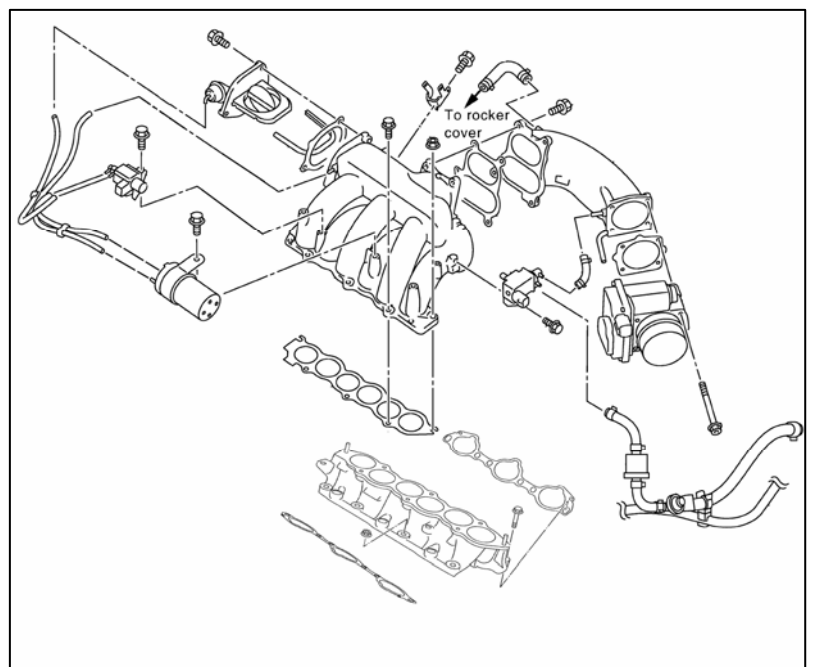
VQ35DE Air Cleaner housing & Air Duct

Air Cleaner housing & ducting is similar in design to what is installed on J31 Maxima.



VQ35DE Intake Manifold Collector

An alloy intake manifold & collector is adopted. Like J31, a variable length intake is utilised. (VIAS)



B – ENGINE MECHANICAL

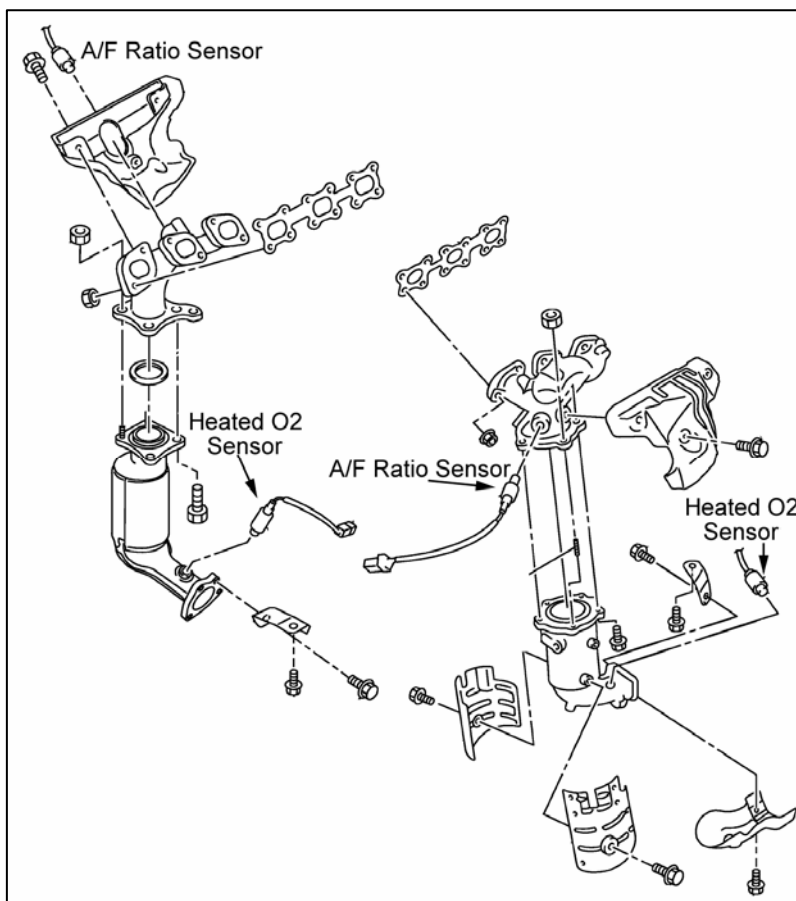
VQ35DE Exhaust Manifold

A tubular style Exhaust Manifold is utilised in conjunction with a 3 way Catalyst on each side.

Air / Fuel Ratio Sensors are installed before the catalyst & Heated O2 Sensors are installed after the catalyst.

Refer to section B – EC of the Service Manual for further information regarding these sensors.

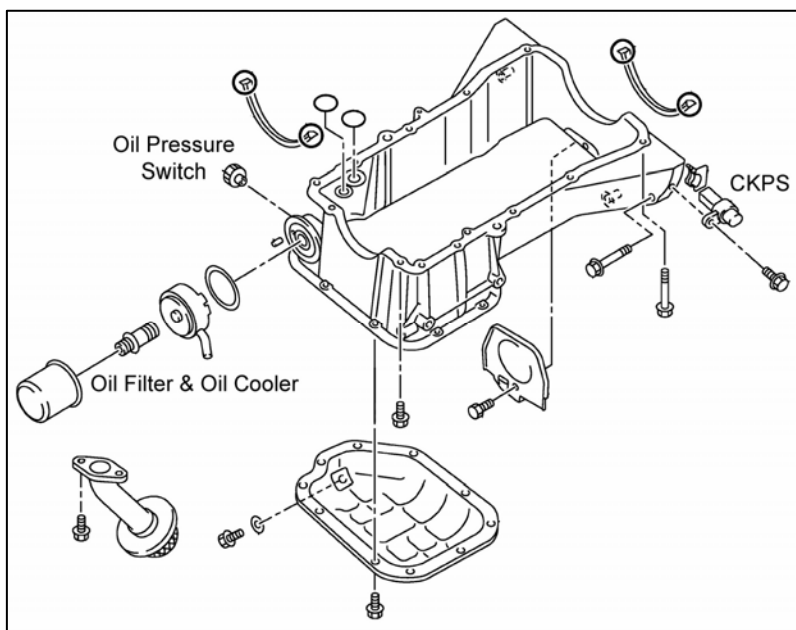
Carefully follow the directions outlined in section B – EM of the Service Manual whenever working on any of the components shown right.



VQ35DE Oil Pan

A 2 piece Oil Pan design is utilised. The upper section is cast alloy & the lower being a steel plate construction. The design is now commonly used for all current Nissan engines.

Further detail & precautions regarding the components shown right can be found in section B – EM of the Service Manual.



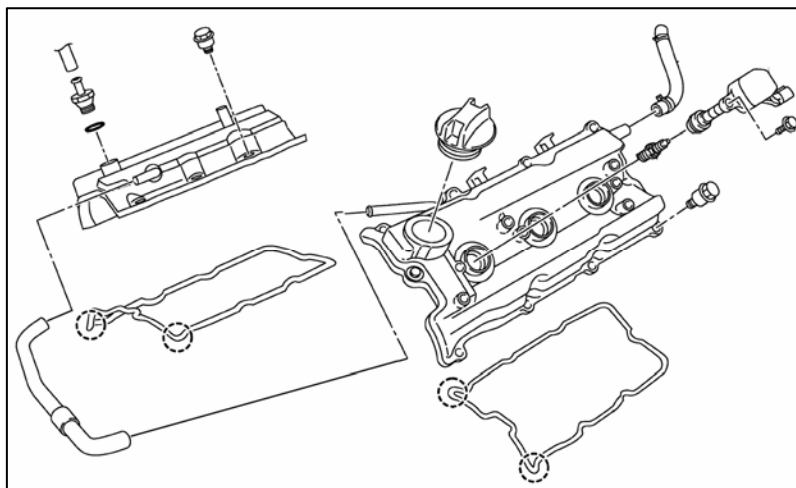
B – ENGINE MECHANICAL

VQ35DE Ignition Coil, Spark Plugs & Rocker Cover

Individual Ignition Coil units are installed on the Engine. The Spark Plugs are platinum type plugs.

Carefully follow the directions outlined in sections B – EM & B – EC of the Service Manual whenever working on any of the components shown right.

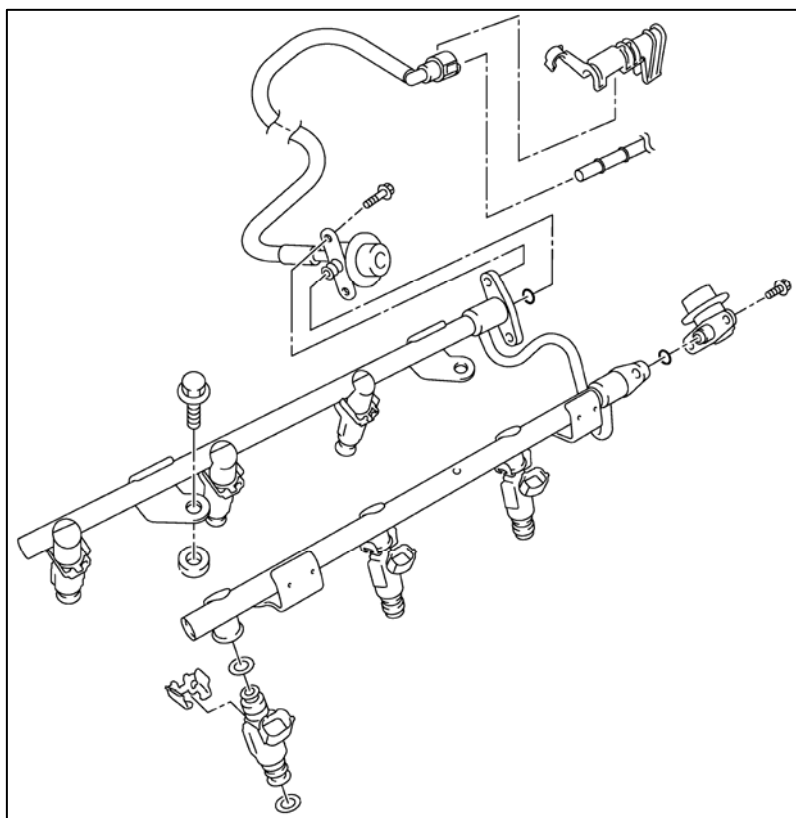
Replacement of the spark plugs will require the removal of the Intake Manifold Collector. Therefore please ensure directions outlined in the Service Manual are carefully adhered to. There are numerous gasket seals & o-rings that cannot be re-used.



VQ35DE Fuel Injector Rail & Injectors

A "Returnless" type Fuel system is utilised. Take care when removing or working on the components shown right.

Refer to sections B – EM & section B – EC when working on the Fuel Rail & injectors or when inspecting the Fuel Pressure.



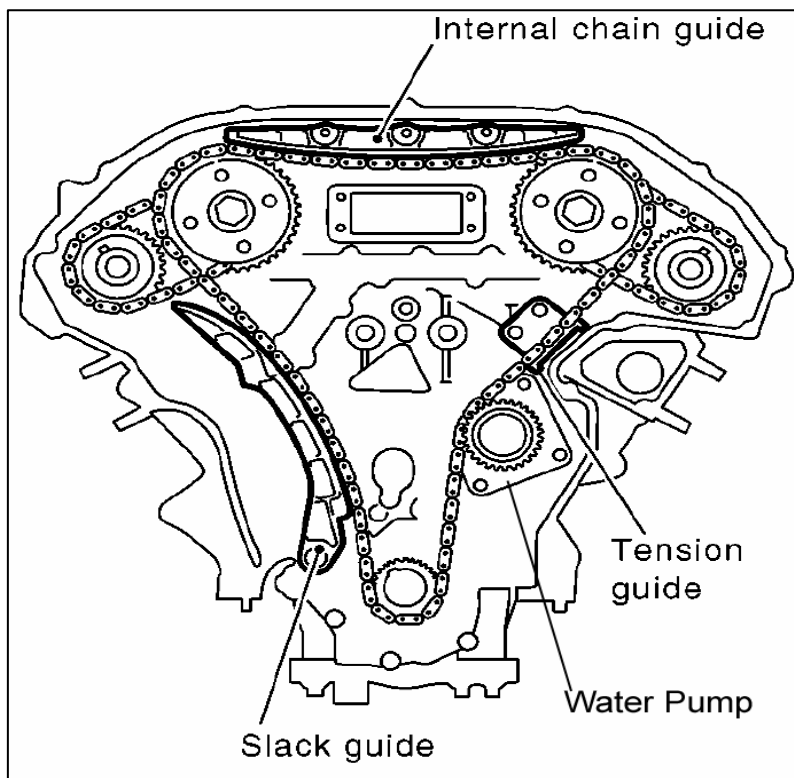
B – ENGINE MECHANICAL

VQ35DE Timing Chain

The Timing chain is the silent type chain, which is the same type utilised on all current VQ engines.

Carefully follow the directions outlined in section B – EM of the Service Manual whenever working on any of the components shown right.

Take extreme care when aligning all marks when re-installing the chains after removal. The Service Manual gives clear & detailed instructions about this.



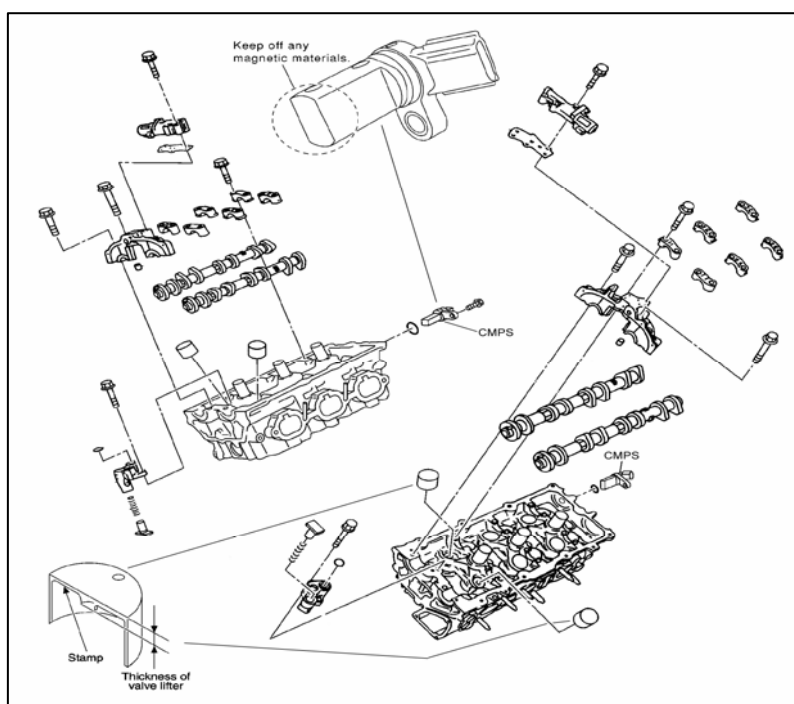
VQ35DE Cylinder Head & Valve Train

The design of the Cylinder Head & Valve train is carried over from VQ35DE engines in J31 & Z33.

Take note that the Valves are adjustable, however the complete valve lifter assembly is available in different thicknesses.

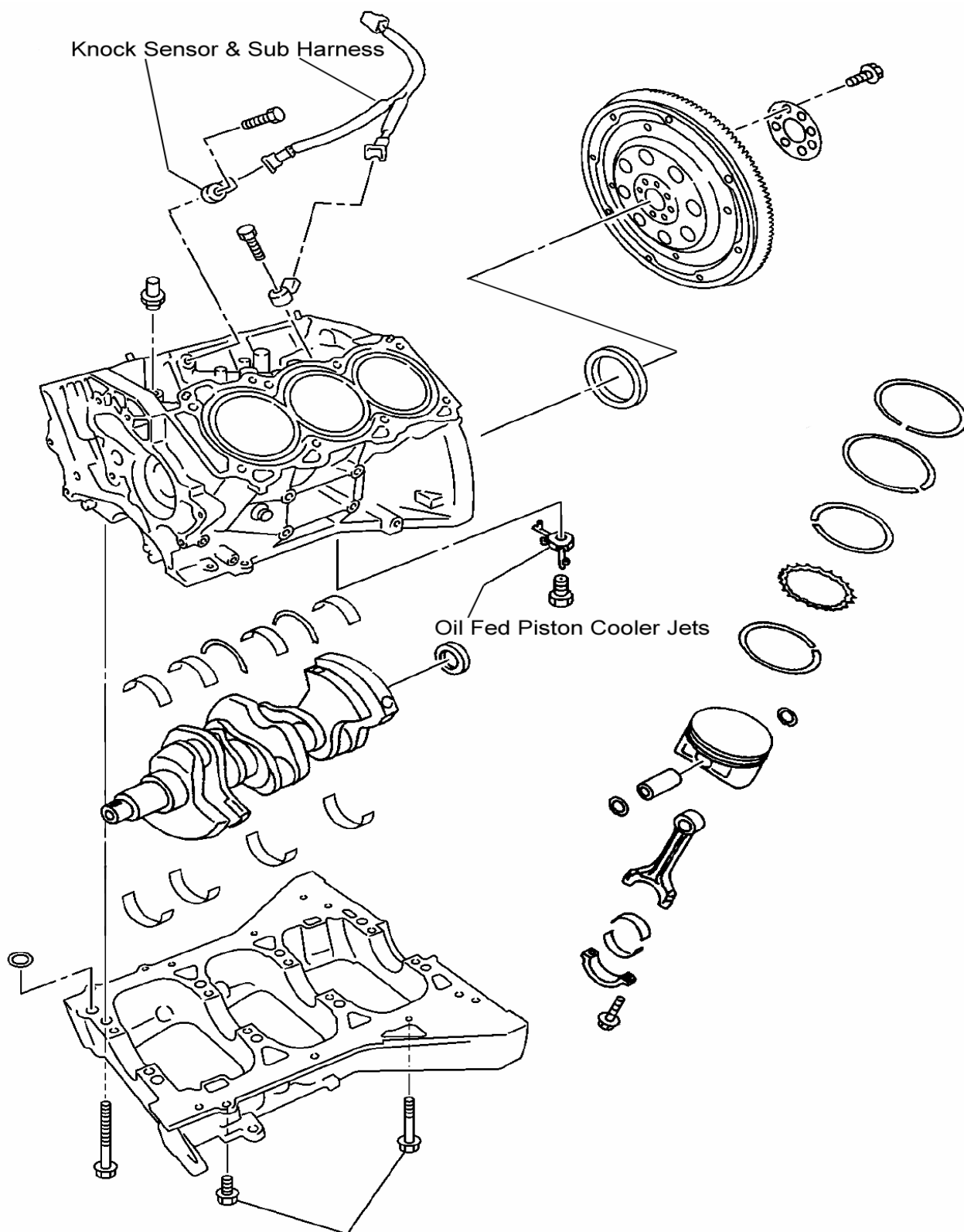
Please follow the instructions in section B – EM of the Service Manual whenever working with any of the components shown right.

Take special note of the colour markings in order to identify Inlet & Exhaust Camshafts.



B – ENGINE MECHANICAL

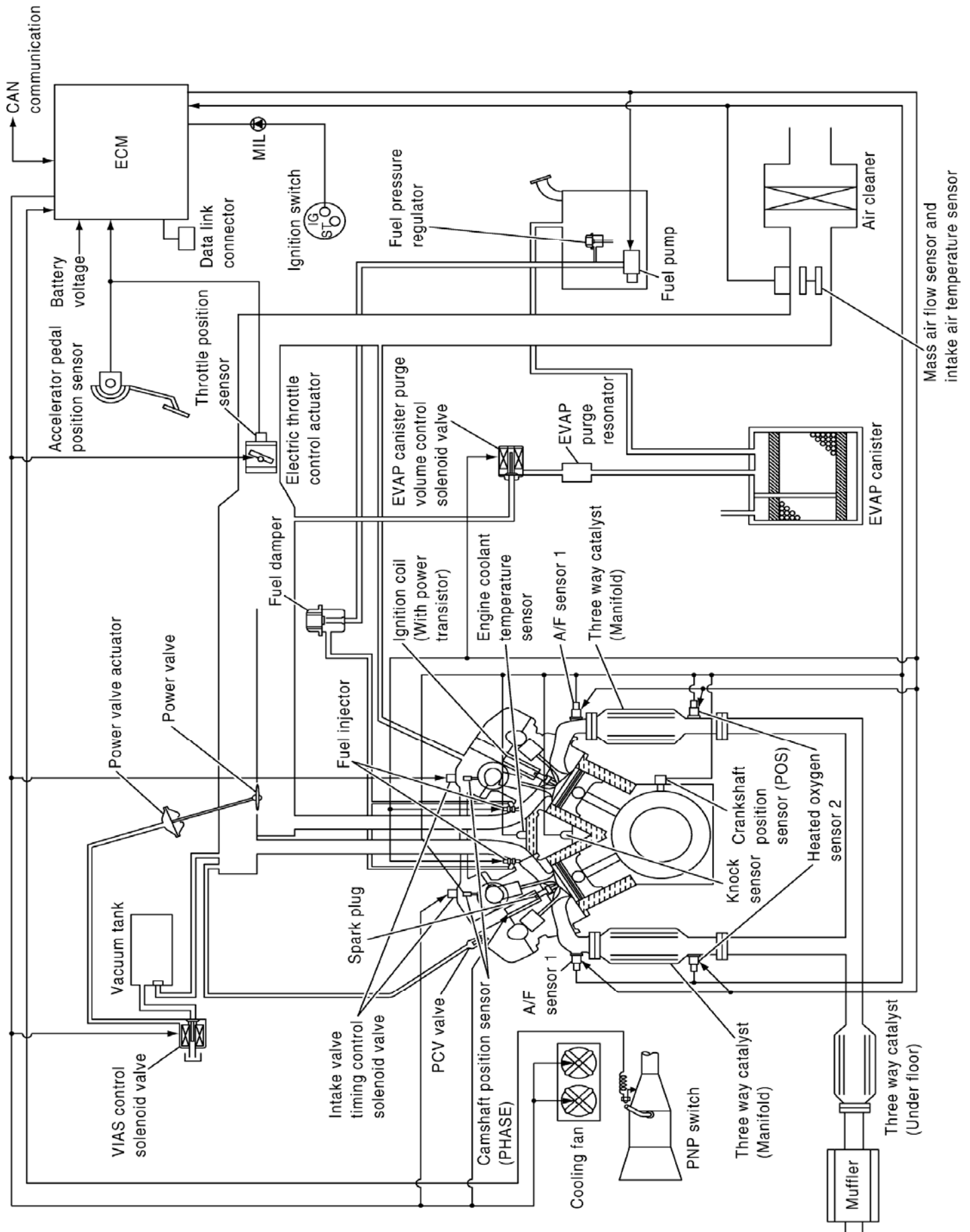
VQ35DE Cylinder Block



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| INPUT | ECM FUNCTION | OUTPUT (ACTUATOR) |
|---|--|---|
| BATTERY VOLTAGE (& GROUND) | FUEL INJECTION QUANTITY | FUEL INJECTOR |
| IGNITION SWITCH ACTIVITY | | |
| ACCELERATOR PEDAL ACTIVITY (POSITION & RATE OF MOVEMENT) | IGNITION COIL CONTROL & IGNITION TIMING | POWER TRANSISTOR (COIL) |
| CRANK POSITION & SPEED | | |
| CAMSHAFT POSITION | | |
| ACTIVITY OF THROTTLE VALVE (POSITION) | VEHICLE SPEED CONTROL (ASCD) | ELECTRIC THROTTLE ACTUATOR |
| OXYGEN CONTENT IN EXHAUST GASES | | |
| ENGINE COOLANT TEMPERATURE | FUEL PUMP CONTROL | FUEL PUMP RELAY |
| MASS AIR FLOW | | |
| INTAKE AIR TEMPERATURE | POWER VALVE CONTROL (VIAS) | VIAS CONTROL SOLENOID VALVE |
| ASCD REQUEST FROM DRIVER | | |
| ASCD CANCEL REQUEST (BRAKE & CLUTCH PEDAL) | COOLING FAN CONTROL | COOLING FAN RELAYS |
| BRAKE PEDAL ACTIVITY | | |
| GEAR LEVER POSITION (P/N) | ENGINE MOUNT CONTROL | ELECTRICALLY CONTROLLED ENG MOUNTS |
| A/C REFRIGERANT PRESSURE (HIGH SIDE) | | |
| POWER STEERING SYSTEM PRESSURE | INTAKE VALVE TIMING CONTROL | INTAKE VALVE TIMING CONTROL SOLENOID VALVE |
| ENGINE DETONATION ACTIVITY | | |
| * VEHICLE SPEED | AIR CONDITIONER CONTROL | AIR CONDITIONER COMPRESSOR RELAY |
| * VEHICLE STABILITY SYSTEM (VDC) ACTIVITY | | |
| * AIR CONDITIONER REQUEST | O2 SENSOR HEATER CONTROL | O2 SENSOR |
| * TRANSMISSION ACTIVITY | EVAPORATIVE EMISSIONS CONTROL | EVAP CANISTER PURGE SOLENOID VALVE |
| * ELECTRICAL LOAD | | |
| (* CAN COMMUNICATION) | ON BOARD DIAGNOSIS | MALFUNCTION INDICATOR LAMP & ECM (SELF DIAGNOSIS – CONSULT II) |



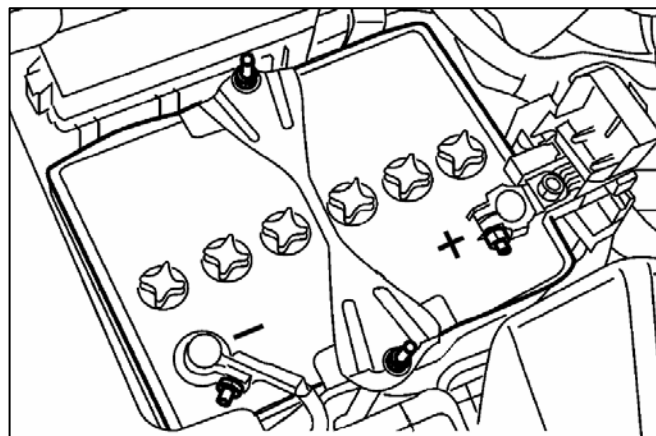
B – ENGINE CONTROL SYSTEM

VQ35DE Inputs to ECM

1a. Battery Voltage

An extremely important input to the ECM for engine operation.

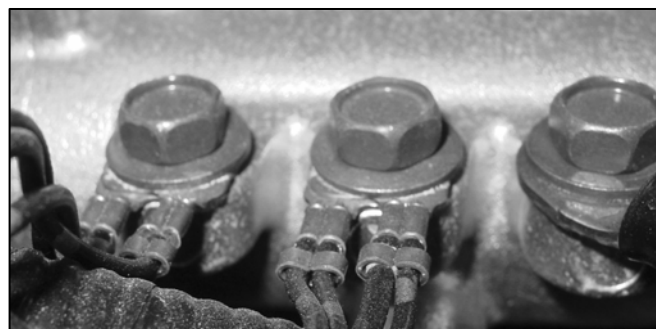
Ensure that the voltage level remains stable, especially during cranking. A situation maybe possible where there is enough battery voltage for cranking, however there maybe an insufficient level for the ECM to operate properly.



1b. ECM Ground

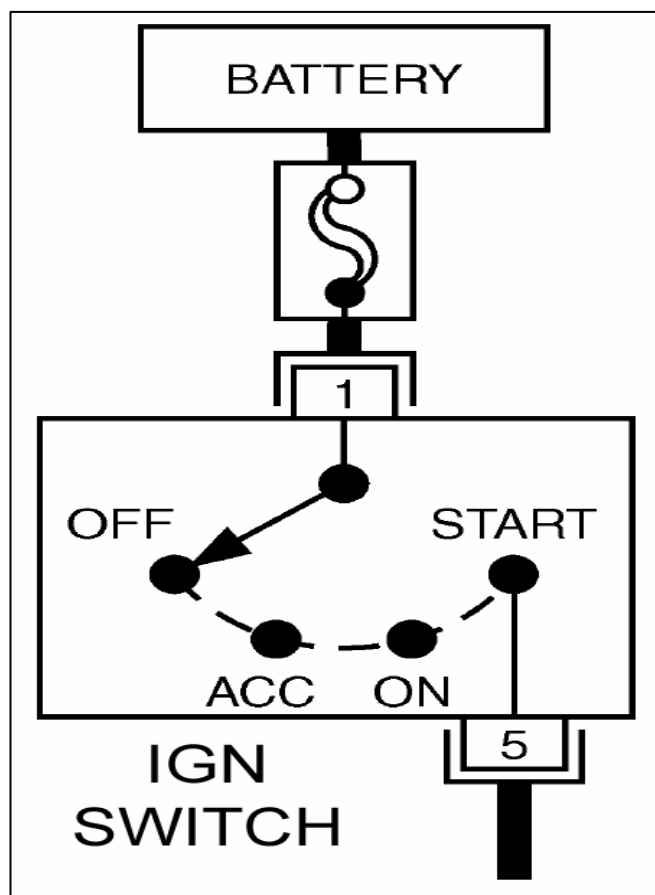
Even though a decent Voltage supply is available to the Engine Control System, if the ECU or major fuel system components do NOT have a decent Ground connection, then correct operation of the Engine System will NOT be possible.

Please ensure any Ground connections as shown here are in good condition (Clean & Tight.)



2. Ignition Switch

The ECM needs to know if the engine is being cranked, if it is simply ON & of course when it is being turned OFF.



B – ENGINE CONTROL SYSTEM

VQ35DE Inputs to ECM

3. Crankshaft Position Sensor (CKPS)

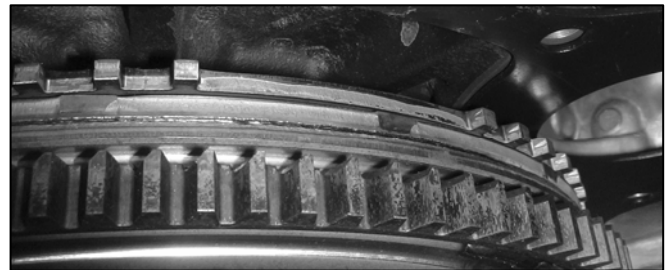
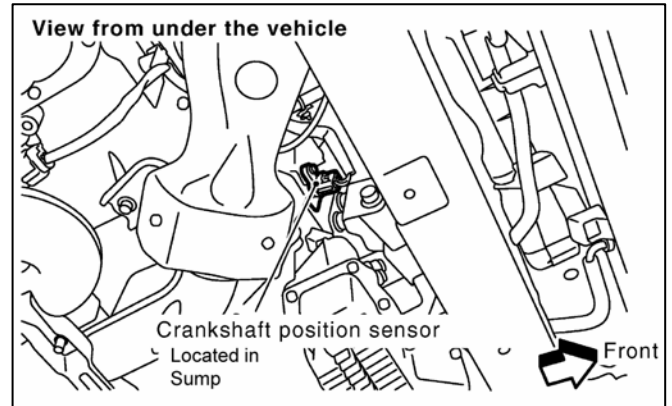
The CKPS is located at the LH rear side of the Engine. (Therefore at the front of the car). It is Attached to the Oil Pan housing (sump) & protrudes through a hole facing the gear teeth (cogs) of the signal plate on the driveplate.

The CKPS informs the ECM of the following information;

- The position of the crankshaft (is the engine at TDC or elsewhere?)
- If the crank is actually moving & if so, how fast.

3 sections of the signal plate does not have “teeth” cut into it. This is to determine the 120-degree TDC point.

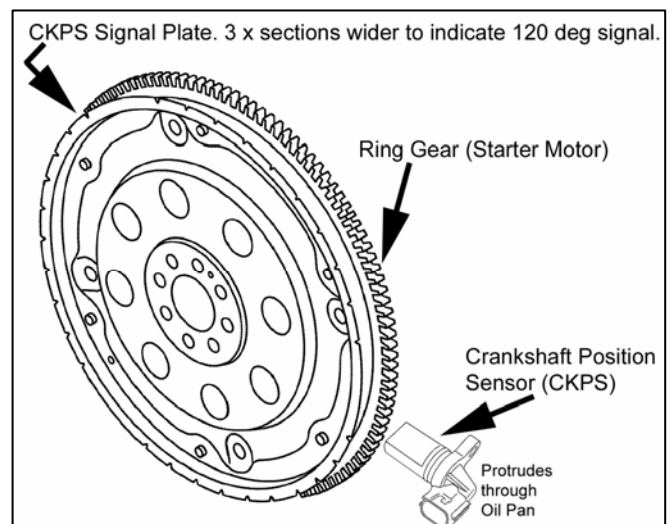
NOTE: A 6 cylinder engine has a pair of pistons at Top Dead Centre (TDC) every 120 deg. A 4 cylinder engine has a pair of pistons at TDC every 180 degrees.)



CAUTION

PLEASE ENSURE THAT THE DRIVE PLATE IS INSTALLED IN THE SAME POSITION THAT IT WAS REMOVED FROM.

IF IT IS INSTALLED ONTO THE CRANKSHAFT IN THE WRONG POSITION (such as 1 bolt hole out) THE ENGINE MAY NOT RUN AT ALL, OR IF IT DOES RUN, LOSS OF PERFORMANCE WILL BE EXPERIENCED & VARIOUS DTC'S WILL BE LOGGED IN RELATION TO CKPS / CMPS FAULTS ETC.



B – ENGINE CONTROL SYSTEM

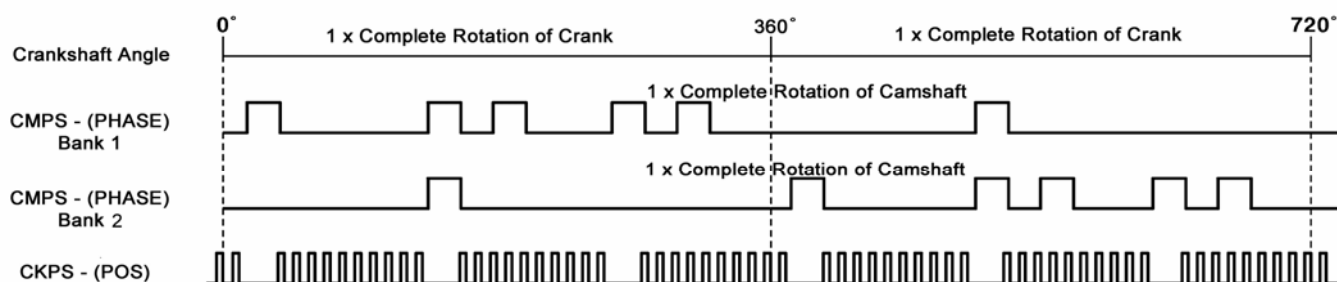
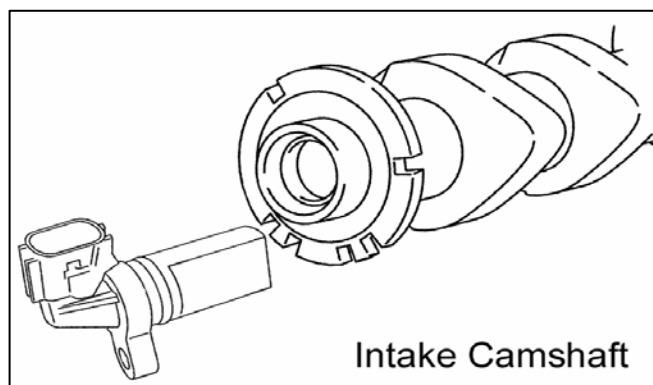
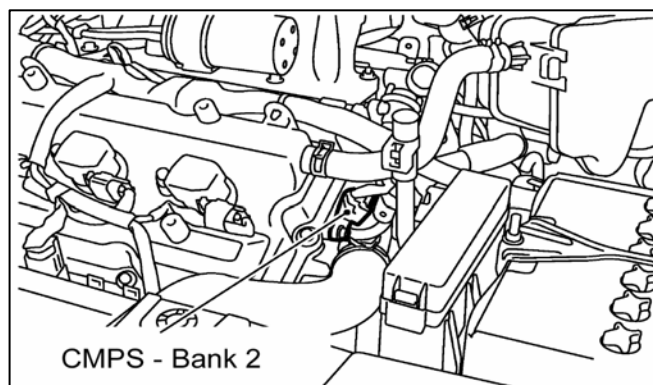
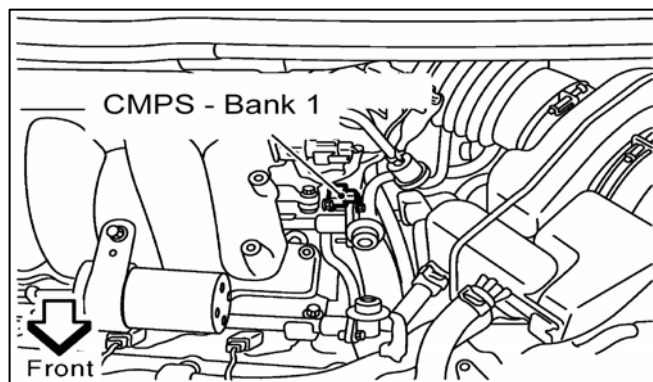
VQ35DE Inputs to ECM

4. Camshaft Position Sensor (CMPS)

The CMPS is located at the left rear of each cylinder head. It senses the camshaft rotation.

The ECM uses this information to identify a particular cylinder's piston position and firing order.

When the CKPS circuit becomes inoperative, the CMPS is able to be used as a back-up signal. This provides some control of the engine management system by utilising the timing of cylinder identification signals.



NOTE: CMPS (PHASE) signal timing varies with Intake Valve Timing Control (C-VTC)

B – ENGINE CONTROL SYSTEM

VQ35DE Inputs to ECM

5. Engine Coolant Temperature Sensor (ECTS)

The Engine Coolant Temperature sensor is used to detect the engine coolant temperature. It's design & operation is the same as other ECT sensors utilised by the Nissan engine range.

6. Mass Air Flow Sensor (MAFS)

The MAFS is placed in the stream of intake air. It measures the intake flow rate by measuring a part of the entire intake flow.

The MAFS controls the temperature of the hot wire to a certain amount. The heat generated by the hot wire is reduced as the intake air flows around it. The more air, the greater the heat loss.

Therefore, the electric current supplied to hot wire is changed to maintain the temperature of the hot wire as air flow increases.

The ECM detects the air flow by means of this current change.

7. Intake Air Temperature Sensor (IATS)

The intake air temperature sensor is built into the MAFS.

The temperature sensing unit uses a thermistor which is sensitive to the change in temperature. Electrical resistance of the thermistor decreases in response to the temperature rise.

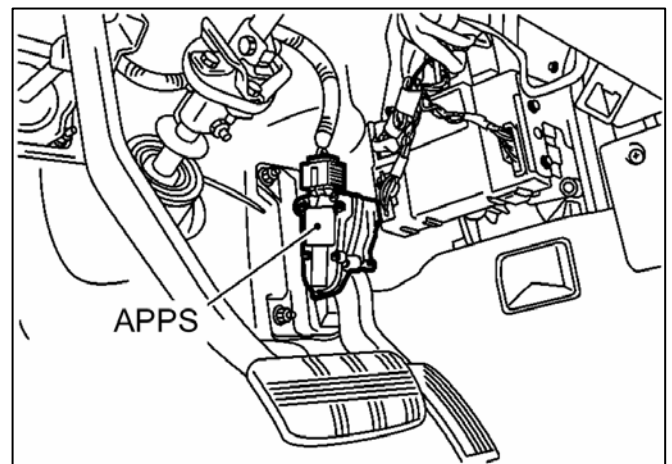
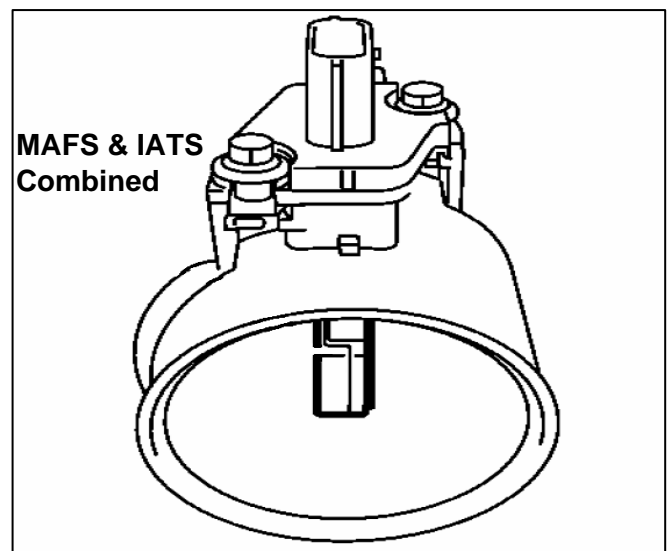
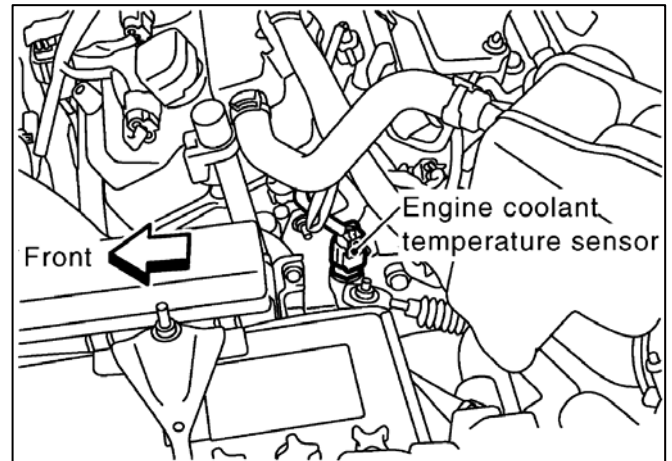
8. Accelerator Pedal Position Sensor (APPS)

The APPS is installed on the upper end of the accelerator pedal assembly. The sensor detects the following items of information;

- Actual Accelerator Pedal Position
- If the pedal is actually moving (being pushed by the driver or not) and if it is moving, the rate of movement (rapid movement or gentle / slow movement).

The ECM controls the throttle control motor based on these signals.

Idle position of the accelerator pedal is determined by the ECM receiving the pre-learned signal from the APPS. The ECM uses this signal for idle control & fuel cut.



B – ENGINE CONTROL SYSTEM

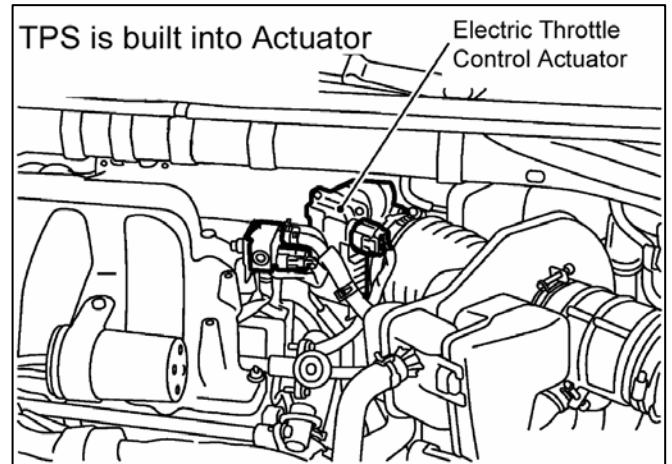
VQ35DE Inputs to ECM

9. Throttle (valve) Position Sensor (TPS)

The TPS responds to the throttle valve movement. It has two sensors. These sensors are potentiometers which transform the throttle valve position into an output voltage and send the voltage signal to the ECM.

The TPS detect's the opening and closing **speed** of the throttle valve as well as the throttle valve **position** and sends the voltage signals to the ECM.

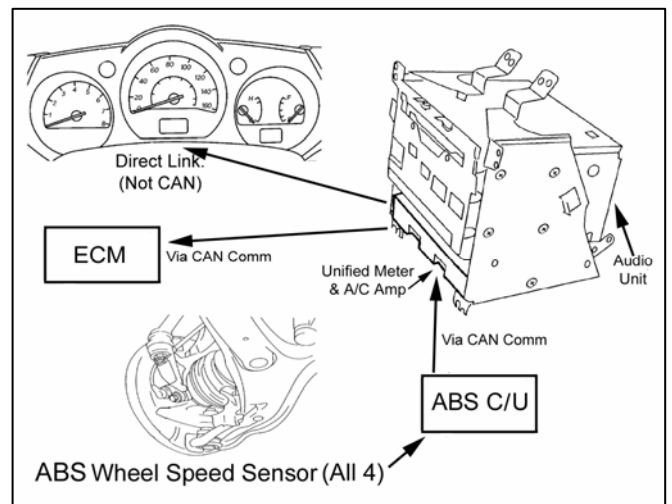
The ECM judges the current opening angle of the throttle valve from these signals and controls the throttle control motor to set the throttle valve opening angle response to the requested driving condition. (Determined from the Accelerator Pedal Position Sensor - APPS).



10. Vehicle Speed Signal

The ECM receives vehicle speed sensor signal via CAN communication line. Even though it is sent from the Unified Meter & A/C Amp, the source of the signal originates from the ABS / VDC system wheel speed sensors.

The ECM primarily uses this signal for ASCD control (Cruise Control).

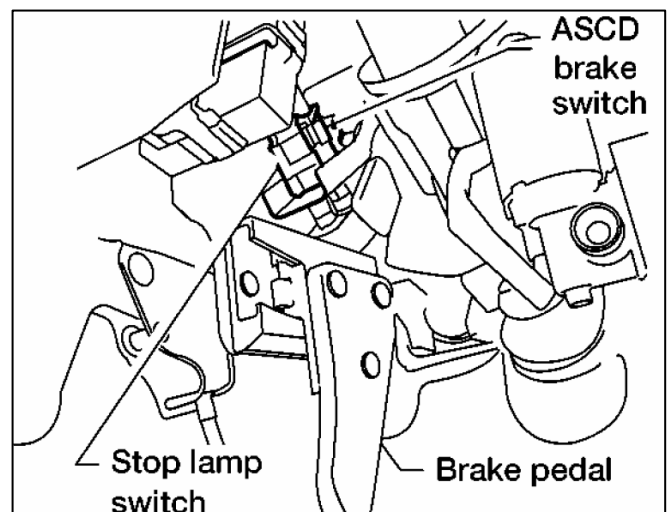


11. Stop Lamp Switch

The stop lamp switch is installed to the brake pedal bracket. The switch senses brake pedal position and sends an ON-OFF signal to the ECM.

This signal is used mainly to decrease the engine speed when the vehicle is driving (moving).

It is found on the Brake Pedal bracket, adjacent to the ASCD Brake Switch.

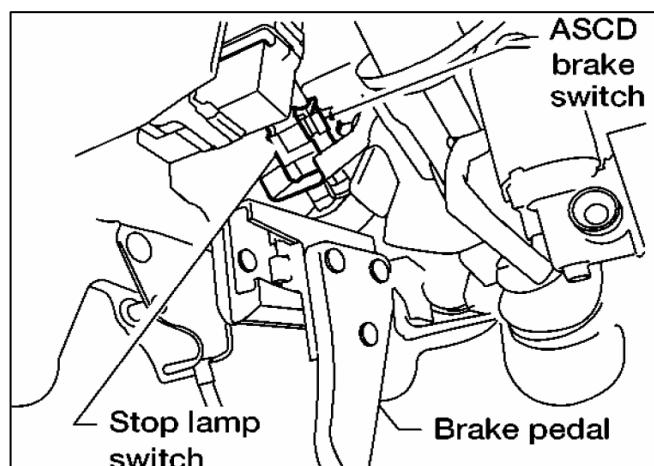


B – ENGINE CONTROL SYSTEM

VQ35DE Inputs to ECM

12. ASCD Brake (pedal) Switch

When the brake pedal is depressed, ASCD brake switch and stop lamp switch are turned ON. ECM detects the state of the brake pedal by these 2 SEPARATE inputs.

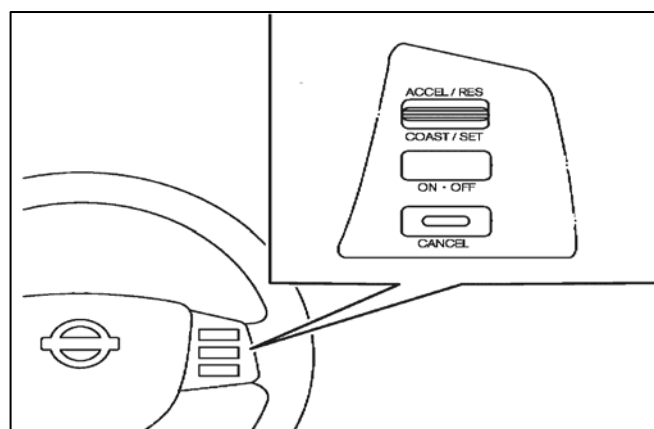


13. ASCD Steering (wheel) Switches

ASCD steering switch has varying values of electrical resistance for each button.

The ECM reads the voltage variation of the switch that is pressed and determines which button is operated.

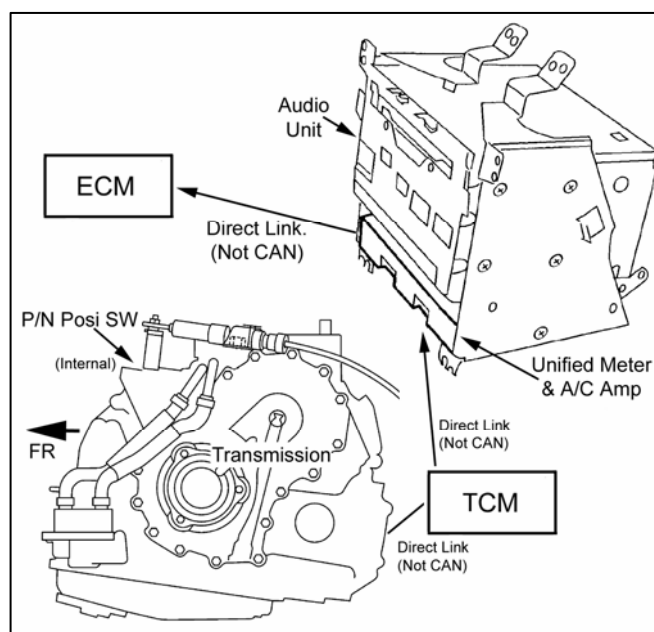
The switches are mounted on the steering wheel.



NOTE: ASCD = Automatic Speed Control Device. (Cruise Control)

14. Park Neutral Position Switch (PNP)

When the gear position is in P or N, Park / Neutral position is ON. ECM detects the position because the continuity of the line (the ON signal) exists.



B – ENGINE CONTROL SYSTEM

VQ35DE Inputs to ECM

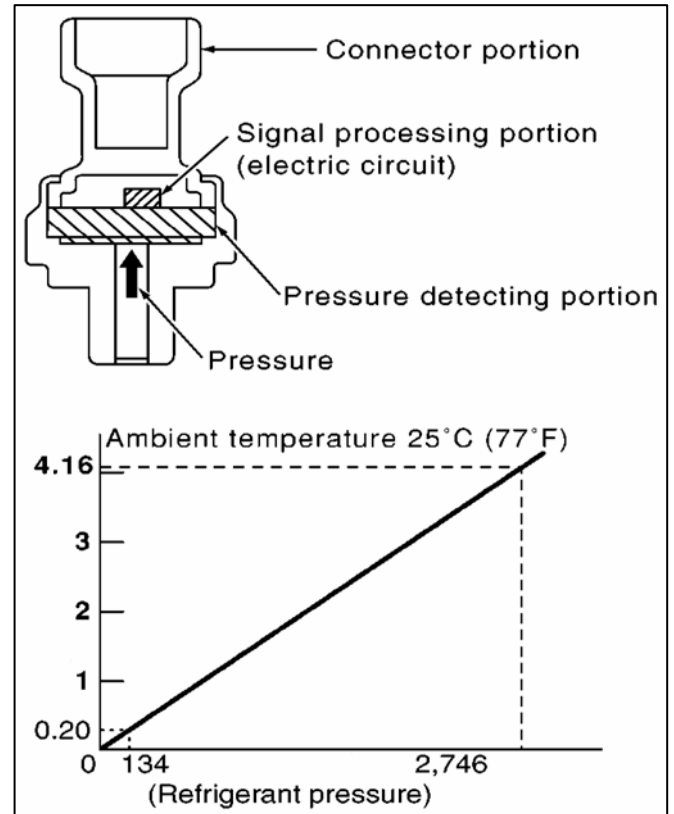
15. A/C Refrigerant Pressure Sensor (RPS)

The RPS is installed on the high pressure pipe between the condenser & the evaporator on the A/C system.

The sensor uses an electrostatic volume pressure transducer to convert refrigerant pressure to voltage. (The pressure of the liquid **after** it has exited the condenser is measured.)

The voltage signal is sent to ECM and it controls the cooling fan system, or disengage the compressor in the event of excessively LOW or HIGH system pressure.

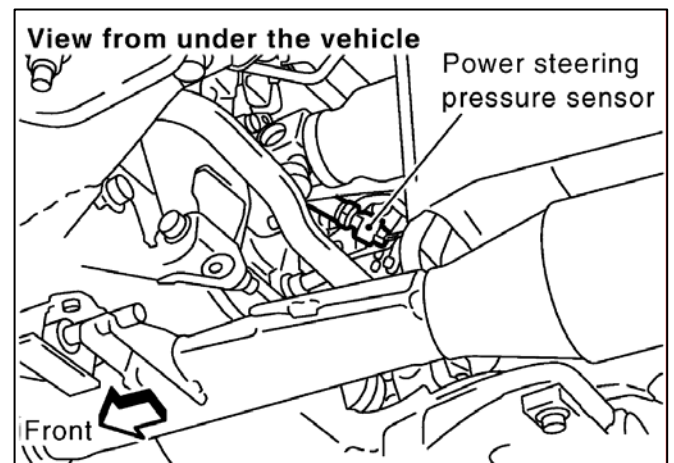
Due to the input of this sensor it can be possible to have Electric cooling fan operation due to high A/C system pressure, yet the engine temperature is cool. Input from this sensor can also assist the ECM to set the most ideal idle speed control for the given conditions. Typically on a hot day, the system pressure is high, therefore the compressor load on the engine is high. The ECM will need to set a higher engine idle speed to cope with the higher load.



16. Power Steering Pressure Sensor (PSP)

The PSP Sensor is installed on the power steering high-pressure tube and detects a power steering load (system fluid pressure).

The sensor is a potentiometer which transforms the power steering load into an output voltage. The voltage signal to the ECM. The ECM controls the Electric Throttle Control actuator (ETC) and adjusts the throttle valve opening angle to increase the engine speed (adjusts idle speed) to compensate for the increased load on the engine.



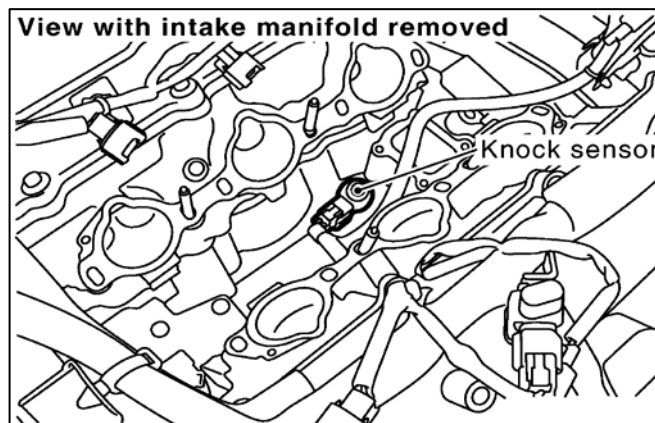
B – ENGINE CONTROL SYSTEM

VQ35DE Inputs to ECM

17. Knock Sensor (KS)

The knock sensor is attached directly to the cylinder block. It senses engine knocking (engine ping) using a piezoelectric element.

A knocking vibration from the cylinder block is sensed as vibrational pressure. This pressure is converted into a voltage signal and sent to the ECM.



18. Transmission Activity.

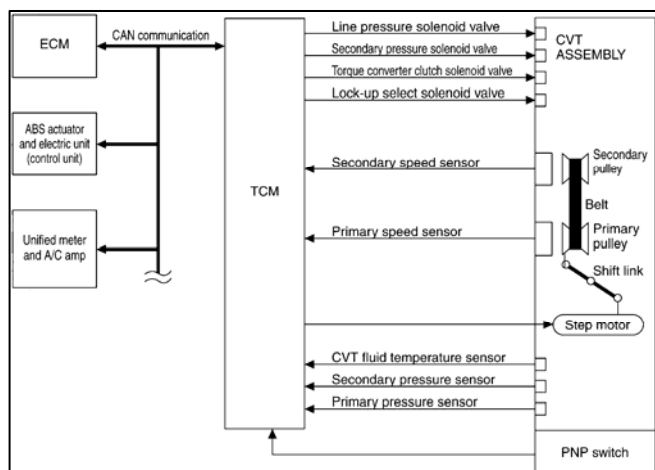
Communication via the CAN network between the ECM & the TCM is constantly taking place.

The Transmission pulley speeds etc (i.e; gear position) is shared with the ECM.

The Engine's activity such as Engine speeds & temperature as well as the drivers commands (Accelerator Pedal activity) is shared with the Transmission.

PLEASE NOTE:

The Park / Neutral signal is a separate input, refer to ECM input no. 14 for more detail.



19. VDC & TCS Activity.

Communication from the ABS / TCS / VDC Control Unit is sent to the ECM via CAN communication.

When the vehicle is un-stabilised due to excessive wheel slip being detected or the vehicle is sliding sideways etc., the ECM assists with re-stabilising the vehicle by control of the throttle valve (ETC) in order to reduce engine power output.





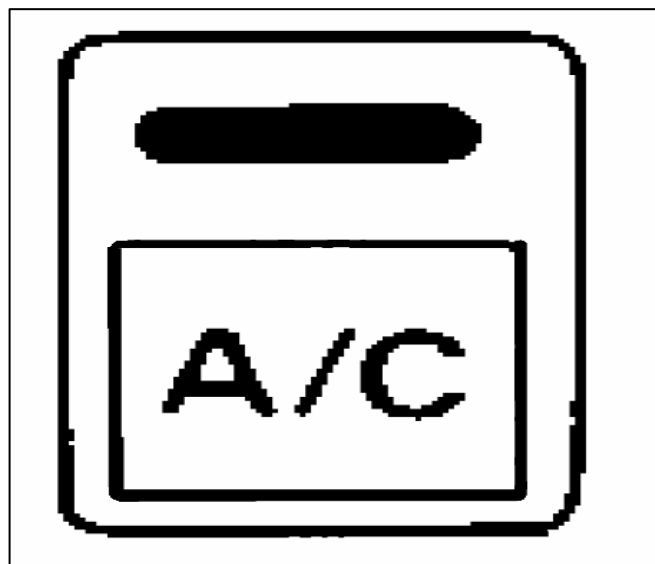
B – ENGINE CONTROL SYSTEM

VQ35DE Inputs to ECM

20. Air Conditioner Request.

A request for Air Conditioner operation is sent from the A/C Control Unit to the ECM via CAN. The ECM looks at various inputs of it's own to determine if it is OK to operate the compressor. (E.G; Eng speed, eng temp, eng loads etc as well as A/C system pressure etc.).

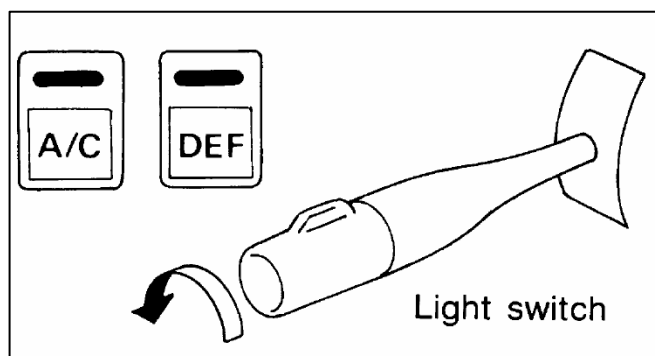
If the ECM allows compressor operation, a signal is sent via CAN to the IPDM E/R to operate the A/C compressor relay (located within the IPDM E/R).



21. Electrical Loads.

Whenever any electrical loads are switched on, a signal is sent to the ECM (typically via CAN).

The ECM will then set a suitable idle speed via control if the ETC to cope with the additional load placed on the engine.



B – ENGINE CONTROL SYSTEM

VQ35DE Inputs to ECM

22. Oxygen Content in Exhaust Gases.

Like all the VQ series V6 engines (excluding A32 VQ30DE), there are 4 x sensors that monitor the Oxygen Content in the Exhaust Gases.

However a new type of Sensor has been introduced in order to more accurately measure the amount of Oxygen left in the exhaust gases after combustion.

Prior to Catalyst – Air Fuel Ratio Sensor.

An all new type of sensor has been introduced on the Z50 for monitoring Oxygen content in the Exhaust gas.

The A/F Ratio Sensor body appearance looks similar to a Zirconia O₂ sensor; however it has a 6 terminal connector with a unique shaped lock.

The sensor is capable of very precise measurement not only within the ideal A/F ratio range, but also in either the lean or rich range.

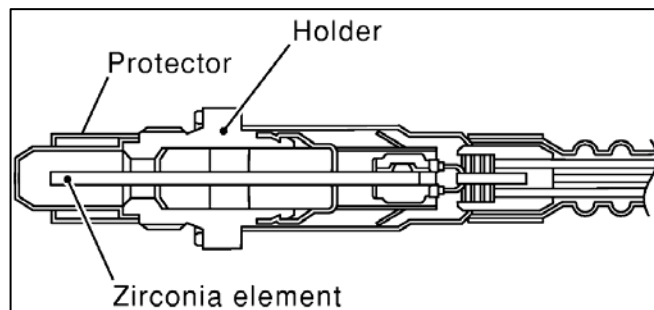
Basic operation of the sensor involves the flow of electrical current through an element within the sensor. The amount of Oxygen in the exhaust gases change the resistance of the element. Therefore the ECM will have to increase current output in order to maintain a set voltage. The basic principle of operation is similar to a Mass Air Flow Sensor.

A typical voltage output provided the engine is functioning correctly is approximately 1.5V.

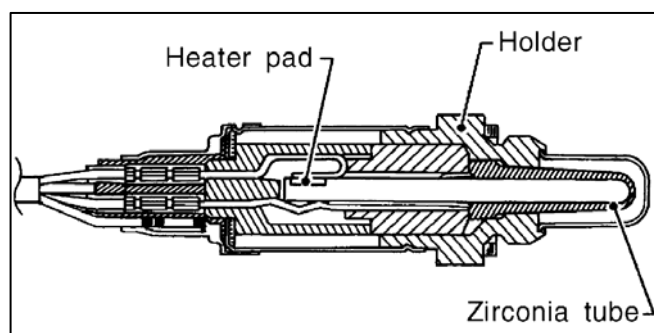
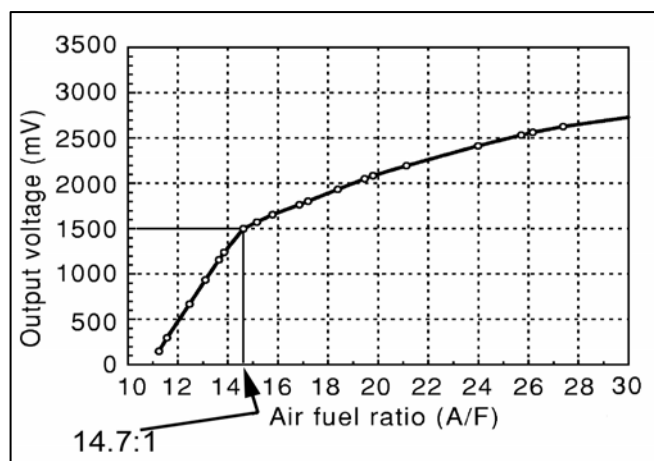
After Catalyst – Heated Oxygen Sensors.

Conventional Oxygen Sensors are utilised to monitor Exhaust gases after the Catalyst.

Under normal conditions the Heated Oxygen Sensor 2 is not used for engine control operation.



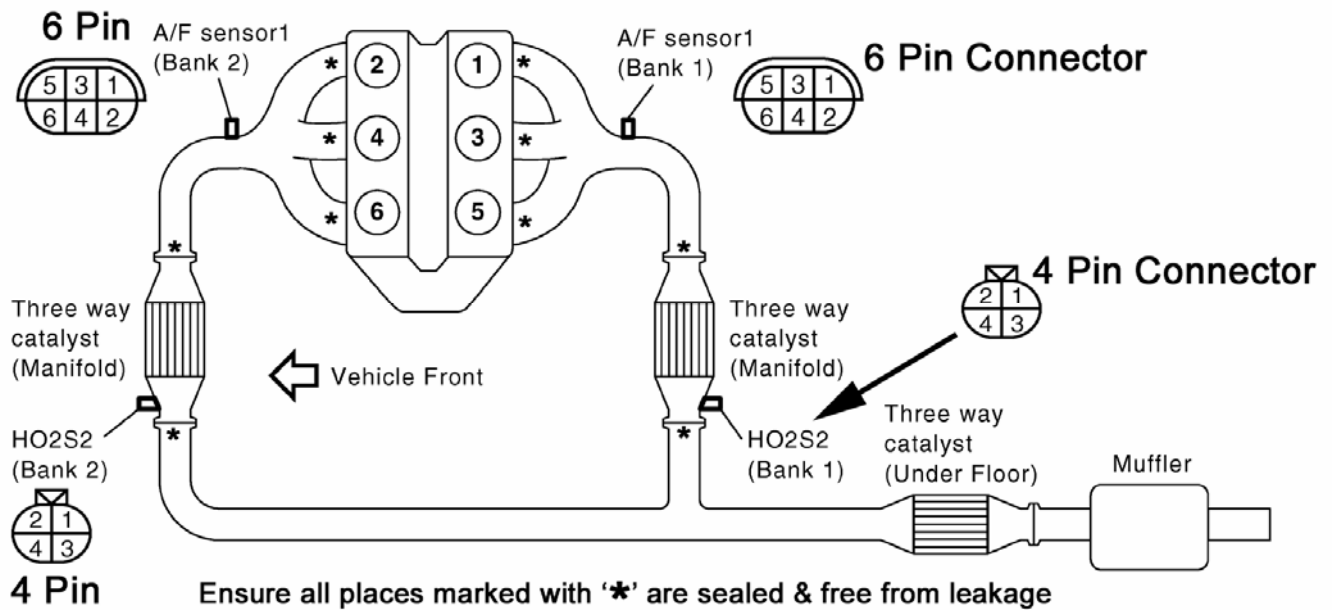
AIR FUEL RATIO SENSOR



HEATED OXYGEN SENSOR

B – ENGINE CONTROL SYSTEM

VQ35DE Oxygen Content in Exhaust Gases



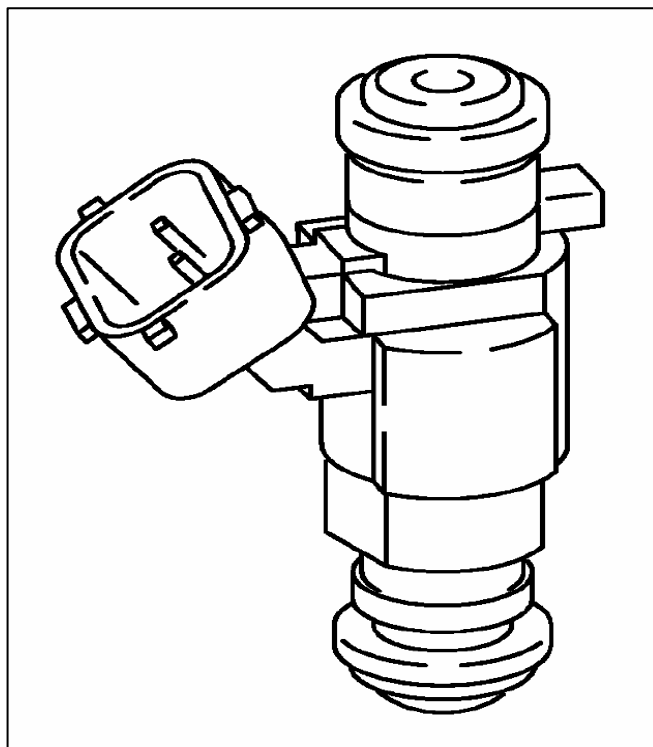
B – ENGINE CONTROL SYSTEM

VQ35DE Outputs from ECM

1. Fuel Injector

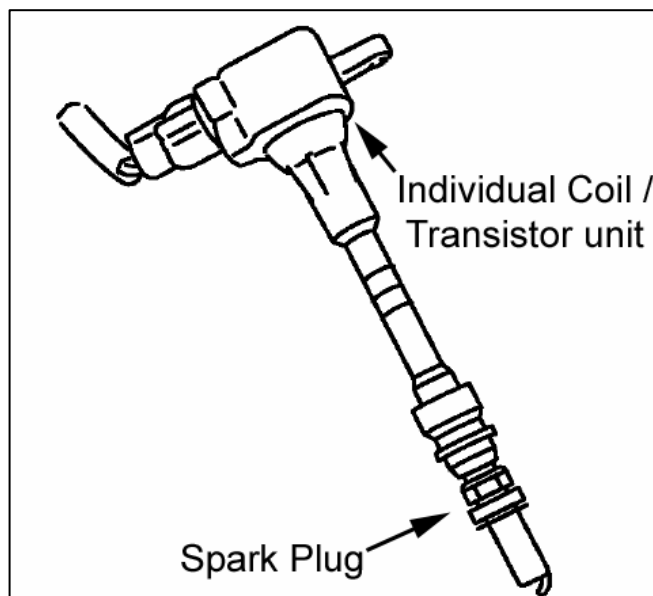
The fuel injector is a small, precise solenoid valve. When the ECM supplies a ground to the injector circuit, the coil in the injector is energized. The energized coil pulls a ball valve back and allows fuel to flow through the injector into the intake manifold port, directly above the inlet valves.

The amount of fuel injected depends upon the injection pulse duration. Pulse duration is the length of time the injector remains open. The ECM controls the injection pulse duration based on engine fuel needs.



2. Ignition Coil & Power Transistor

The ignition signal from the ECM is sent to and amplified by the power transistor. The power transistor turns ON and OFF the ignition coil primary circuit. This ON/OFF operation induces the necessary high voltage in the coil secondary circuit.

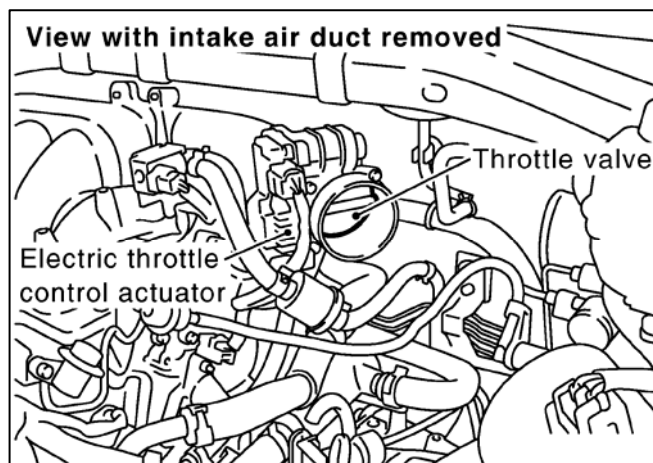


B – ENGINE CONTROL SYSTEM

VQ35DE Outputs from ECM

3. Electric Throttle Actuator

Electric throttle control actuator consists of throttle control motor & throttle position sensor (TPS). The throttle control motor is operated by the ECM and it opens and closes the throttle valve. The throttle position sensor detects the throttle valve position and the opening and closing speed of the throttle valve and sends the voltage signal to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.

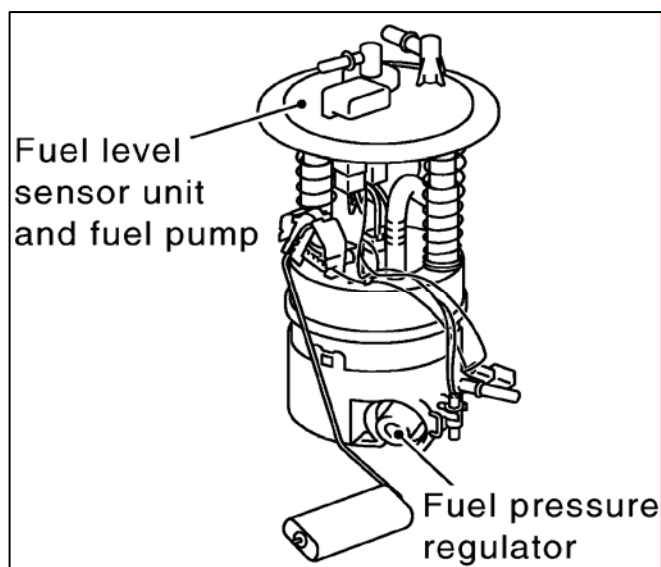


4. Fuel Pump Control

The ECM activates the fuel pump relay for 1 second after the ignition switch is turned ON. If the ECM receives a engine speed signal from the camshaft position sensor (CMPS), it knows that the engine is rotating and operates the fuel pump relay which in turn operates the pump. If the engine speed signal is not received when the ignition switch is ON (engine stalls), the ECM will stop pump operation.

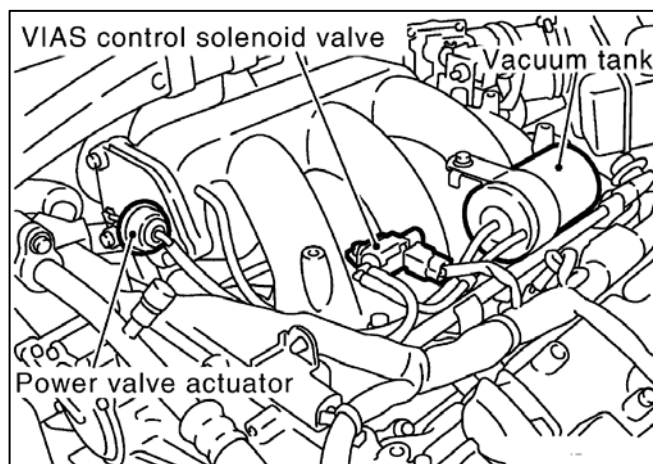
The ECM does not directly drive the fuel pump. It switches fuel pump relay ON or OFF, which in turn controls the fuel pump.

The Fuel Pump relay is located with the IPDM E/R unit.



5. Variable Intake Air System (VIAS) Control Solenoid Valve

The VIAS control solenoid valve cuts the intake manifold vacuum signal for power valve control. It responds to ON/OFF signals from the ECM. When the solenoid is OFF, the vacuum signal from the intake manifold is cut. When the ECM sends an ON signal, the coil pulls the plunger downward and feeds the vacuum signal to the power valve actuator.



B – ENGINE CONTROL SYSTEM

VQ35DE Outputs from ECM

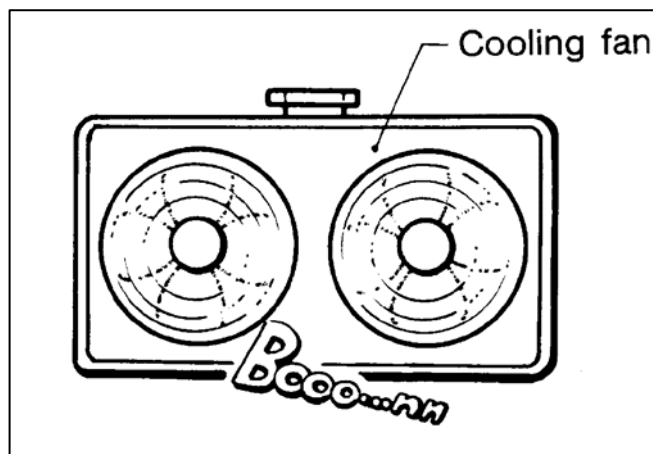
6. Cooling Fan Control

The ECM controls the cooling fan relays corresponding to the vehicle speed, engine coolant temperature, A/C refrigerant pressure and air conditioner ON signal.

The control system has 3-step control HIGH / LOW / OFF.

The ECM does not directly drive the cooling fans. It switches the fan relays ON or OFF, which in turn controls the cooling fans.

The cooling fan relays are located within the **IPDM E/R** unit.



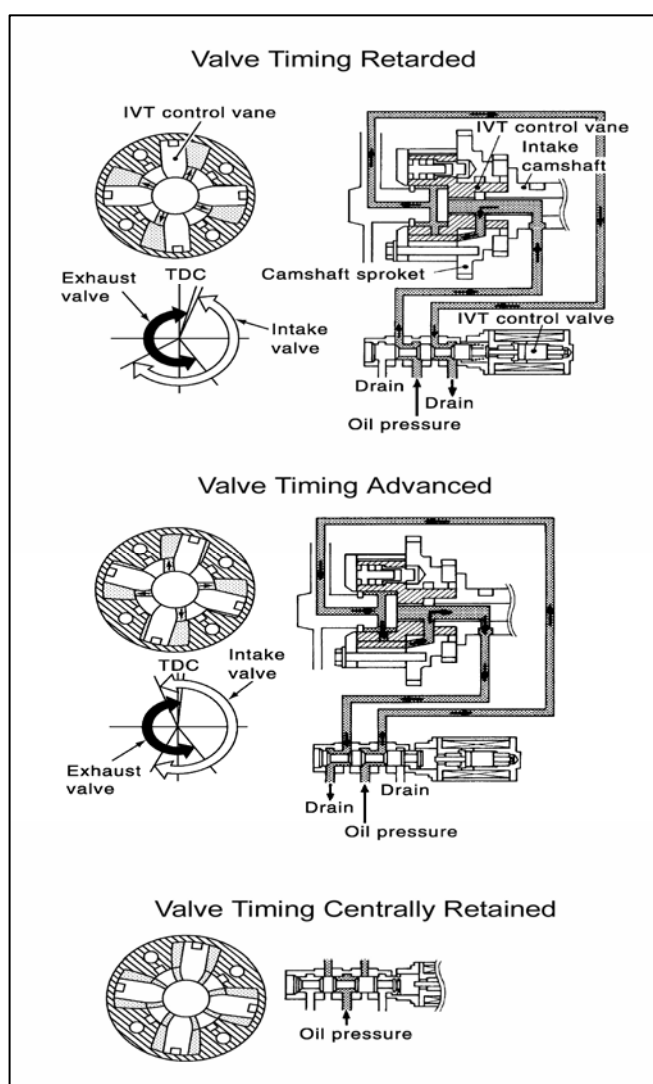
7. Intake Valve Timing (IVT) Control Solenoid Valve

The ECM receives signals such as crankshaft position, camshaft position, engine speed and engine coolant temperature. The ECM then sends ON/OFF pulse duty signals to the intake valve timing control solenoid valve depending on the driving status.

This makes it possible to control the shut/open timing of the intake valve to increase engine torque in low/mid speed range and output in high-speed range. There are 2 x IVT Control Solenoid Valves & they are located at the front of each rocker cover.

SPECIAL NOTE:

If the wrong type of Engine or the Engine Oil is LONG OVERDUE for changing, this mechanism can jam in the one position & malfunction. Typically a DTC in relation to a fault with the CMPS maybe logged. Ensure engines with such systems installed on them are WELL SERVICED.



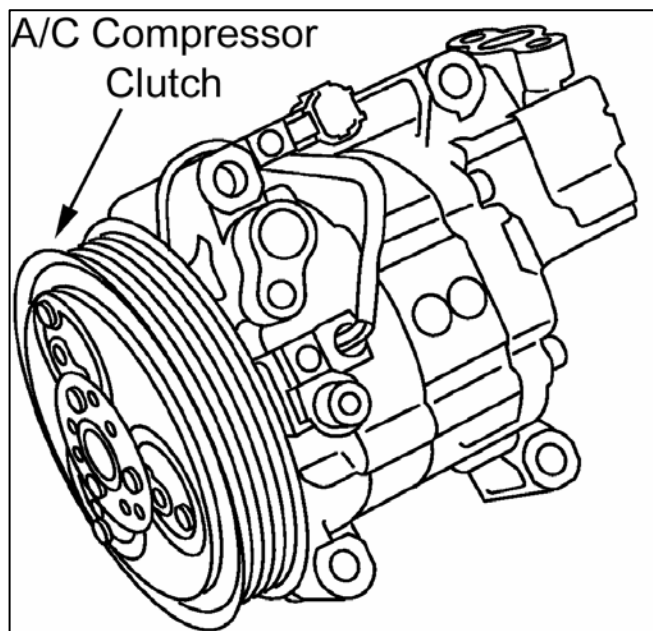
B – ENGINE CONTROL SYSTEM

VQ35DE Outputs from ECM

8. Air Conditioner Control

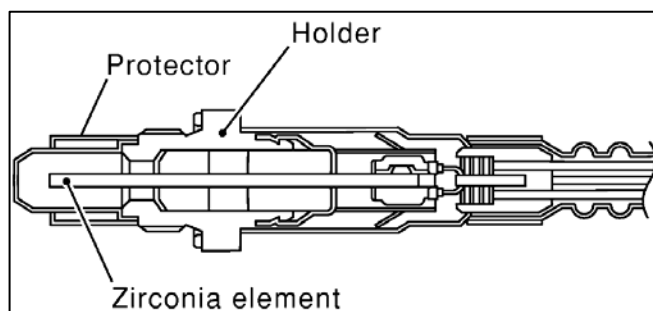
The ECM has the final control over the A/C compressor operation (Compressor relay). Air Conditioning is typically required due to a driver request coming from the A/C Amplifier / Control Panel on the dash via CAN.

If conditions such as a demand for rapid acceleration, excessive engine temperature, excessive A/C system pressure or lack of A/C system pressure (no gas) are NOT evident, the ECM will send a signal via the CAN to the IPDM E/R to switch ON the A/C relay. The A/C relay is located within the IPDM E/R unit.



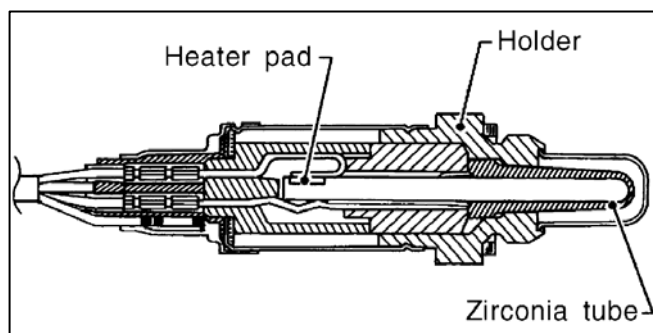
9. Air Fuel Ratio Sensor Heater Control

The ECM performs ON/OFF duty control of the A/F sensor 1 heater corresponding to the engine operating condition to keep the temperature of A/F sensor element at the specified range.



10. O2 Sensor Heater control

The ECM performs ON/OFF control of the heated oxygen sensor heater corresponding to the engine speed, amount of intake air and engine coolant temperature.



B – ENGINE CONTROL SYSTEM

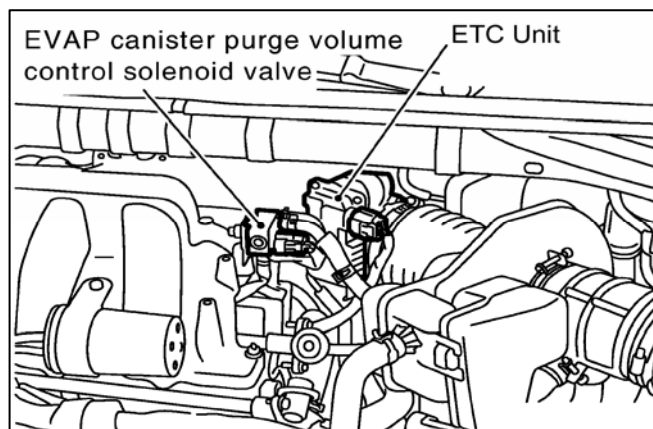
VQ35DE Outputs from ECM

11. EVAP Canister Purge Volume Control Solenoid Valve

The EVAP canister purge volume control solenoid valve uses a ON/OFF duty to control the flow rate of fuel vapour from the EVAP canister.

The EVAP canister purge volume control solenoid valve is operated by ON/OFF pulses from the ECM. (rapidly opened & closed).

The longer the ON pulse, (opened for a longer period than closed) the greater the amount of fuel vapour that will flow through the valve.

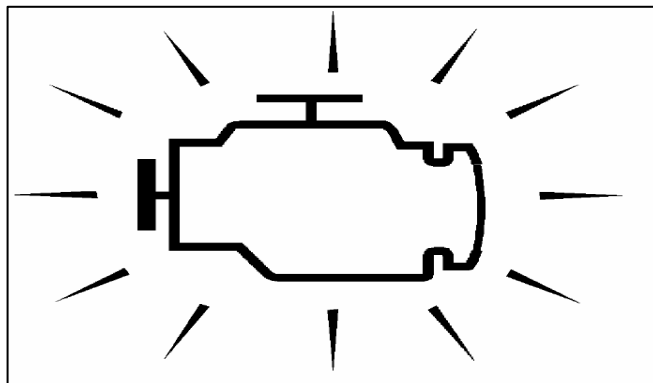


12. Malfunction Indicator Lamp (MIL) & Self Diagnosis

If a fault within the Engine System is detected, the ECM will log a Diagnostic Trouble Code (DTC).

CONSULT II is required to read these codes.

In some cases the logging of some codes may also activate an ORANGE coloured Malfunction Indicator Lamp (MIL) on the instrument cluster.



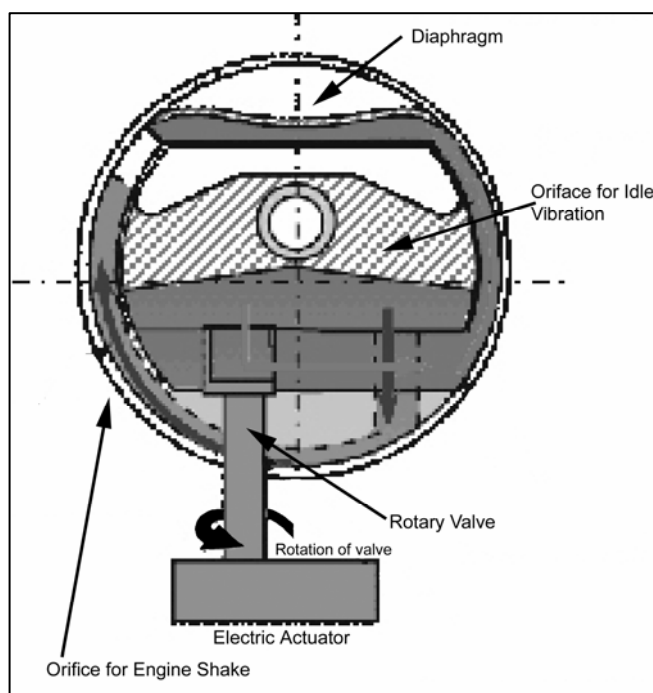
13. Electronically Controlled Engine Mounts

The ECM controls the engine mount operation corresponding to the engine speed and the vehicle speed.

The control system has 2-step control [Soft/Hard].

Contained within the mount is fluid which is allowed to flow between 2 chambers within the mount.

Direct operation of an electric motor by the ECM opens & closes an orifice which controls the flow of the fluid in order to make the mount soft or hard.



B – ENGINE CONTROL SYSTEM

VQ35DE Basic Service

1. Idle Speed Check

With CONSULT II, select “ENGINE & then “DATA MONITOR” & view the idle speed by viewing “Engine Speed” in “Main Signals”)

2. Ignition Timing Inspection

Given that the engine is installed with a CKPS monitoring the movement & position of the Crankshaft (flywheel) & 2 x CMPS sensors monitoring the movement & position of each of the inlet camshafts, the ECM has the ability to “see” where the Crankshaft is in relation to the Camshaft & adjust the timing by itself accordingly. Therefore it is NOT necessary to check the ignition timing at normal service intervals etc.

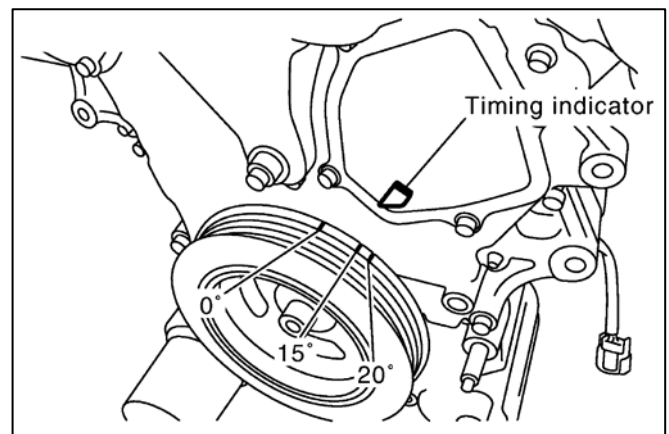
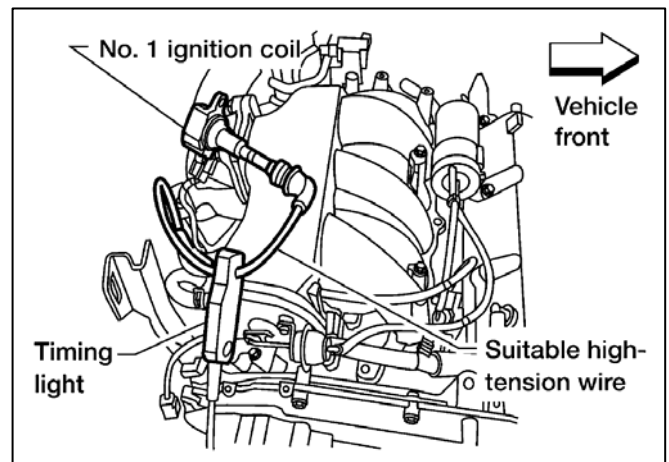
HOWEVER, it maybe necessary to inspect the ignition timing as part of a Trouble Diagnosis procedure.

If so desired, the actual Ignition Timing can be inspected in the traditional manner to ensure the CKPS & CMPS systems are operating correctly. As shown right, remove No. 1 ignition coil, install **Special Service Tool (SST) # E7032** & check the ignition timing. The engine must be idling at operating temperature & ALL accessories OFF. Compare the reading seen by the timing light with the “Ignition Timing” reading in Data Monitor on CONSULT II.

Typical Scenario’s which may cause the Ignition timing to be out of specification;

- The Driveplate / Flywheel has been removed & re-installed in the wrong place. (1 bolt hole out etc.)
- The inlet camshaft variable timing mechanism has jammed in the advanced or retarded position. Typically due the engine oil never being changed.
- Foreign object has damaged the sensor pick-up ring on the Driveplate / Flywheel. Remove the starter motor or inspection plate to check inside the bell-housing.
- Foreign object / material has damaged / obstructed the camshaft signal plate / sensor.
- Idle Air Volume Learn (IAVL) hasn’t “Completed” (CMPLT)
- “Target Ignition Timing” (“Work Support” in CONSULT II) is incorrectly set.

| DATA MONITOR | |
|--------------|---------|
| MONITOR | NO DTC |
| ENG SPEED | XXX rpm |

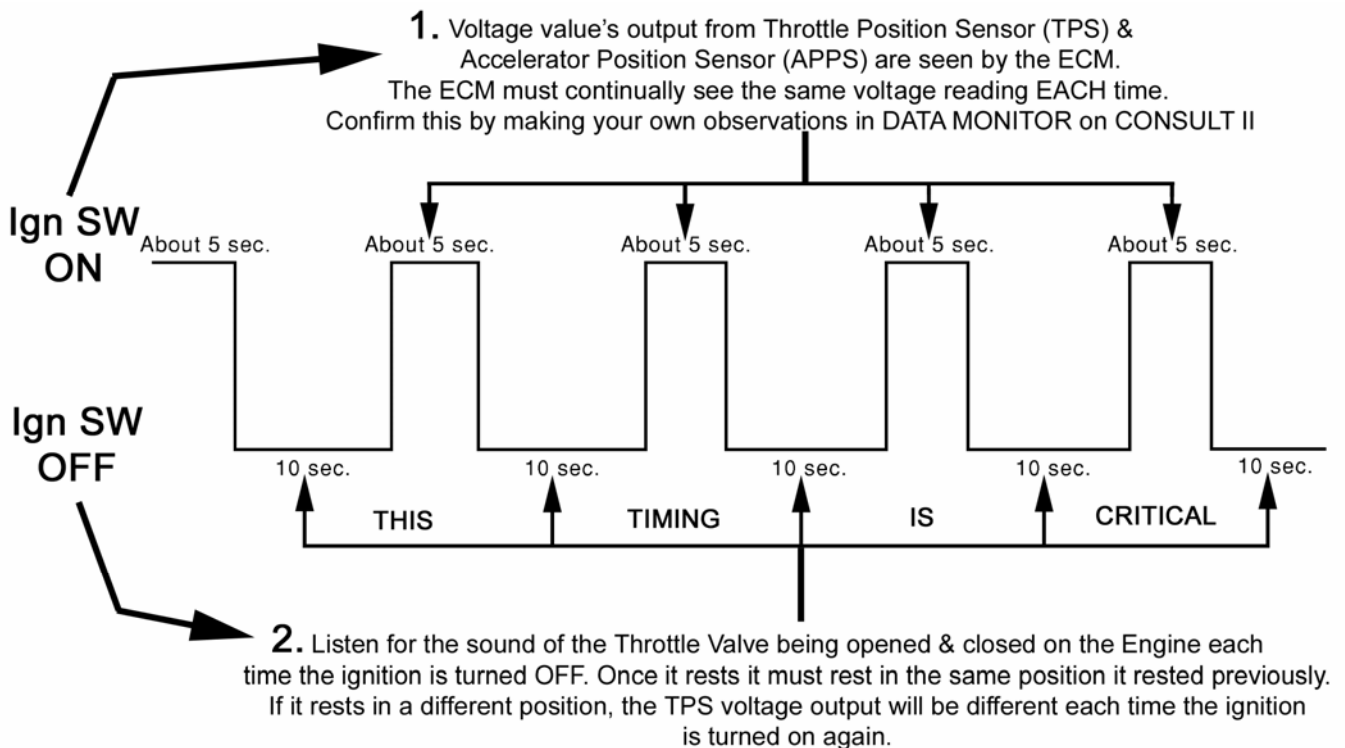




B – ENGINE CONTROL SYSTEM

VQ35DE Basic Service

3. Accel'r Pedal Released Pos'n Learning & Throttle Valve Closed Pos'n Learning.



THIS SIMPLE OPERATION IS CRITICAL

Ensure the time frame suggested above for each key position is observed. "10 sec" means 10 actual seconds on an accurate watch or stop watch. NOT 10 "mini" seconds or 10 "that'll be right" seconds!!

This 2 in 1 learning operation is an EXTREMELY important operation that MUST be carried out for any of the following reasons;

- After the Reprogramming of an ECM – **BUT BEFORE THE ENGINE IS STARTED!!**
- A new or substitute ECM is installed in the vehicle. (Along with reprogramming ALL of the NATS ignition keys. Make sure you get **ALL THE KEYS** from the owner / driver)
- A new or substitute Throttle Body Unit is installed on the vehicle.
- The existing throttle body unit is cleaned.
- Battery power has been lost for a long period of time.
- Prior to carrying the Idle Air Volume Learn (IAVL) operation.



B – ENGINE CONTROL SYSTEM

VQ35DE Basic Service

4. Idle Air Volume Learn (IAVL)

The completion of this operation in around 15 seconds is a good indication that the engine operation is OK.

Reasons why the IAVL will not “CMPLT”.

- Both Target settings found in “Work Support” on CONSULT II are not set to “0”
- Engine is not at operating temperature. Even though the Engine may feel hot, make sure this temperature is indicated on CONSULT II Data Monitor
- Poor Power Supply to ECM
- Bad Ground Connections for ECM
- An Electrical Load is ON.
- Switch inputs such as P/N Posi, Power Steering pressure are indicating that the transmission is in Neutral or the Power Steering system is under load.
- There is a BASIC ENGINE MECHANICAL problem such as an intake system air leak, compression issues, fuel supply issues or ignition system issues.
- The Accelerator Pedal Released Position Learning & Closed Throttle Position Learning has **NOT** been carried out properly
- Throttle valve isn't closed properly. Typically excessive carbon is fouling the operation of the throttle unit.

5. Fuel Pressure Check

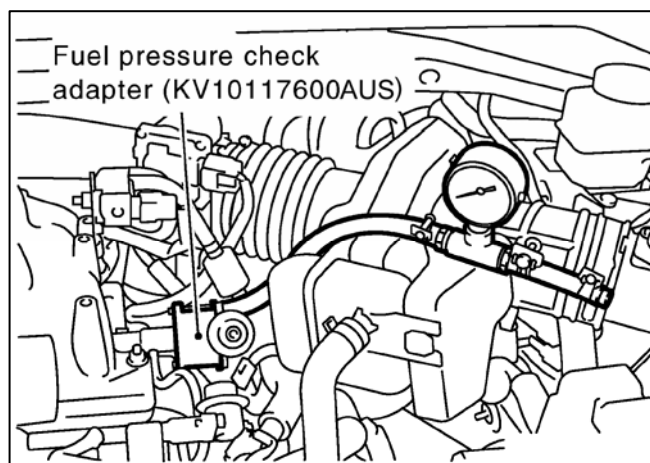
The engine has a “Returnless” type of fuel system. Ensure that there is a **CONSTANT PRESSURE OF 350 kPa AT ALL TIMES** - whilst the engine is idling, or under full load. The Fuel pressure should never vary.

Check the following items if the Fuel Pressure is too LOW;

- Blocked fuel pump pick-up / filter (the fuel filter forms part of the pump assembly)
- Restricted fuel lines
- Faulty fuel pressure regulator. (The pressure regulator also forms part of the fuel pump assembly)

If the Fuel Pressure is too HIGH, replace the fuel pressure regulator.

| WORK SUPPORT | |
|--------------------|---------|
| IDLE AIR VOL LEARN | CMPLT |
| MONITOR | |
| ENG SPEED | XXX rpm |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| START | |

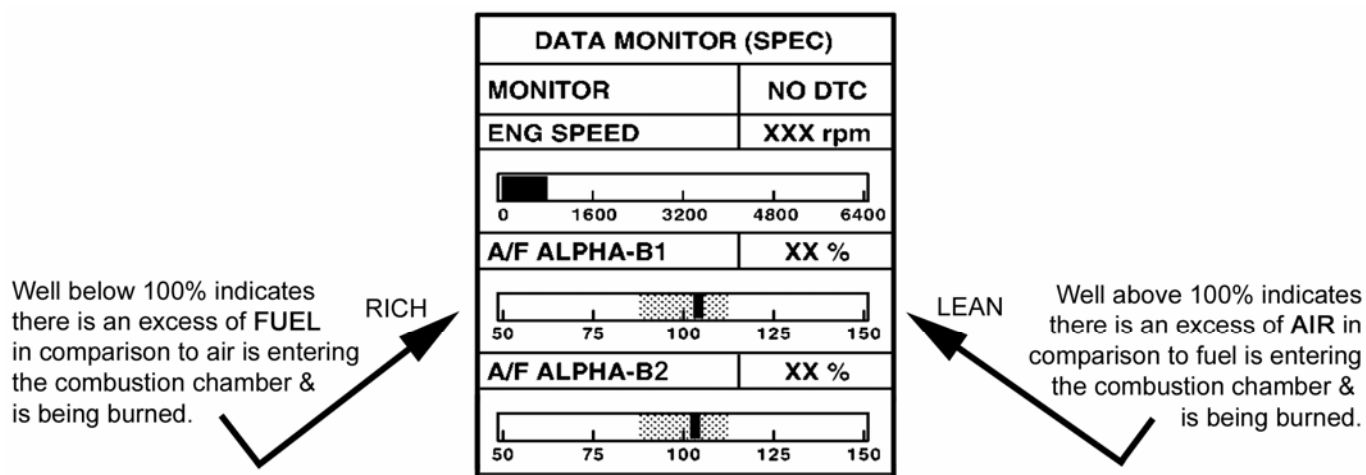




B – ENGINE CONTROL SYSTEM

VQ35DE Basic Service

6. “A/F ALPHA” Inspection



Procedure:

1. Road Test vehicle briskly for 10 km's. Engine & Transmission should be at operating temperature.
2. Confirm that the IAVL can be successfully completed.
3. Ideally the vehicle should have more than 5000km's on it. (Vehicle has been properly "run in").
4. Ensure that the engine has been properly serviced. Ensure the correct grade / type of oil is in the engine & the level is correct. Ensure components such as spark plugs, air filter's etc are serviceable / genuine parts. Ensure that the correct Part Numbered components have been installed.
5. Ideally the barometric pressure should be 98.3 – 104.3 kPa.
6. Ideally the atmospheric temperature is between 20 – 30 deg C.
7. Engine speed is idling, (The IAVL must have achieved a "CMPLT").
8. With CONSULT II select options in the following order; "ENGINE" – "DATA MONITOR (SPEC)" – "SELECTION FROM MENU" – "A/F ALPHA" (select the 2 of them. A V6 engine will have 2 banks of cylinders that need to be monitored) – "START". The screen in the graphic above should now appear.
9. With the engine under the conditions requested in steps 1 ~ 6, what does the black bar indicator do?
 - (i) Does it remain stable & central within the hashed area? (If so, all is OK. See next page for "B/FUEL SCHEDULE" inspection.)
 - (ii) Does it move out of the hashed area below 100%? If so, see next page for "RICH" trouble indication.
 - (iii) Does it move out of the hashed area above 100%? If so, see next page for "LEAN" trouble indication.



B – ENGINE CONTROL SYSTEM

A/F ALPHA Indicates “RICH” (Well below 100%)

Check the following Items:

- Engine Oil is contaminated with excessive fuel or it is the wrong viscosity or overdue for changing. Change engine oil & filter if in doubt.
- Air Flow through the air intake is restricted, check for interference of airflow.
- Fault with EVAP system (fuel is being drawn directly from fuel tank breathing system & entering inlet manifold.)
- Leaking injectors.
- Excessively high fuel pressure.
- Try a known good Mass Air Flow Sensor.

A/F ALPHA Indicates “LEAN” (Well above 100%)

Check the following Items:

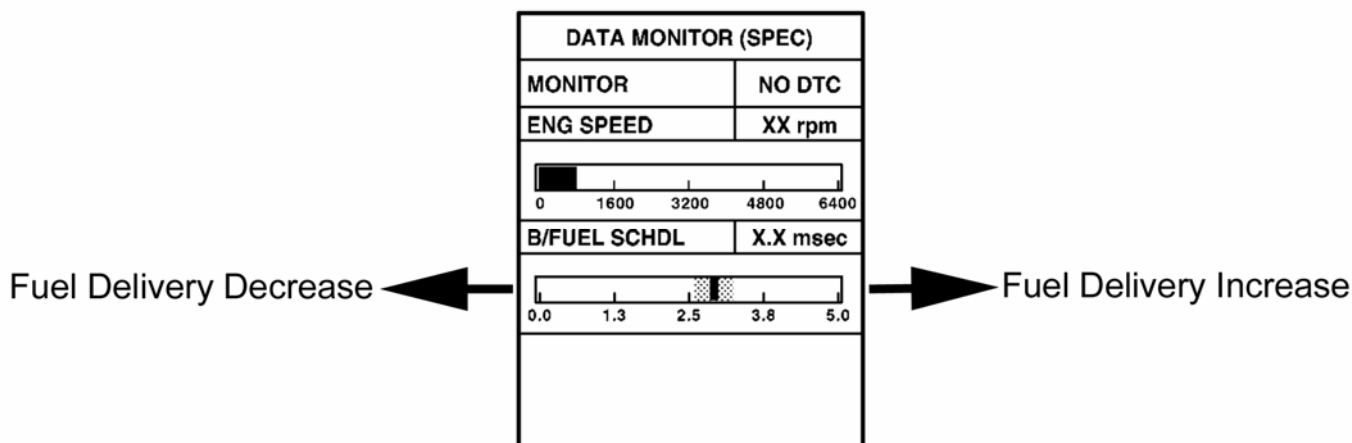
- Air Leaks before & after the throttle or in the Inlet Manifold. Gaskets, seals, hoses, cracks etc.
- Air Leaks in the Engine. Gaskets, seals, rocker cover, oil cap, dip stick, rear main oil seal etc.
- Air Leaks in Exhaust. Manifold gaskets, flange gaskets, cracks etc.
- Engine is lacking Fuel. Fuel pressure is too low, pump output is poor, fuel filter / tank pick-up is blocked, hoses kinked / blocked or the pressure regulator not maintaining the pressure correctly.
- Cylinder miss-fire due to bad spark. Worn / non genuine spark plug, faulty coil / coil connection / coil ground connection.
- Cylinder miss-fire due to bad / no injector operation. (injector dribbling fuel, not spraying).
- Interference with the airflow through the air intake. Possible blockage or modified air intake system.
- Try a known good Mass Air Flow Sensor



B – ENGINE CONTROL SYSTEM

VQ35DE Basic Service

7. “B/FUEL SCHDL” Inspection (Base Fuel Schedule)



Procedure:

1. Road Test vehicle briskly for 10 km's. Engine & Transmission should be at operating temperature.
2. Confirm that the IAVL can be successfully completed.
3. Ideally the vehicle should have more than 5000km's on it. (Vehicle has been properly "run in").
4. Ensure that the engine has been properly serviced. Ensure the correct grade / type of oil is in the engine & the level is correct. Ensure components such as spark plugs, air filter's etc are serviceable / genuine parts. Ensure that the correct Part Numbered components have been installed.
5. Ideally the barometric pressure should be 98.3 – 104.3 kPa.
6. Ideally the atmospheric temperature is between 20 – 30 deg C.
7. Engine speed is idling, (The IAVL must have achieved a "CMPLT").
8. With CONSULT II select options in the following order; "ENGINE" – "DATA MONITOR (SPEC)" – "SELECTION FROM MENU" – "B/FUEL SCHDL" – "START". The screen in the graphic above should now appear.
9. With the engine under the conditions requested in steps 1 ~ 6, what does the black bar indicator do?
 - (i) Does it remain stable and central within the hashed area? If so this is OK. See earlier page for "A/F ALPHA" inspection & check. If A/F ALPHA as well as B/FUEL SCHDL is OK, engine condition is normal.
 - (ii) Does it move out of the hashed area below the indicated value? If so, see next page for "Fuel Delivery Increase" inspection.
 - (iii) Does it move out of the hashed area above the indicated value? If so, see next page for "Fuel Delivery Decrease" inspection.



B – ENGINE CONTROL SYSTEM

B/F SCHDL Indicates a Fuel Delivery Decrease

Check the following Items:

Interference with Air Flow through the intake system:

- Restriction of Air-Flow.
- Blocked Air Filter.
- Modified Air Intake System. Non standard components in Air Intake system have been fitted.
- Valve clearances incorrect.
- Engine Compression is not to spec.
- Try a known good MAFS.

B/F SCHDL Indicates a Fuel Delivery Increase

Check the following Items:

Excessive Engine Friction:

- High viscosity Engine Oil. Use correct grade of engine oil for the engine.
- Engine Oil Level too high.
- Engine Oil is overdue for changing. (High viscosity).
- Excessive external drive belt tension.
- Mechanical fault with engine. (High engine load required to turn engine)
- Mechanical fault in Transmission. (High engine load required to drive transmission)

Insufficient Combustion:

- Valve clearances incorrect.
- Valve Timing incorrect. (Correlation between camshaft & crankshaft is incorrect).
- Intake Valve Timing Control mechanism fault. (Valve timing advance / retard unit could be jammed).

Other:

- Interference with the airflow through the air intake. Possible blockage or modified air intake system.
- Try a known good MAFS.

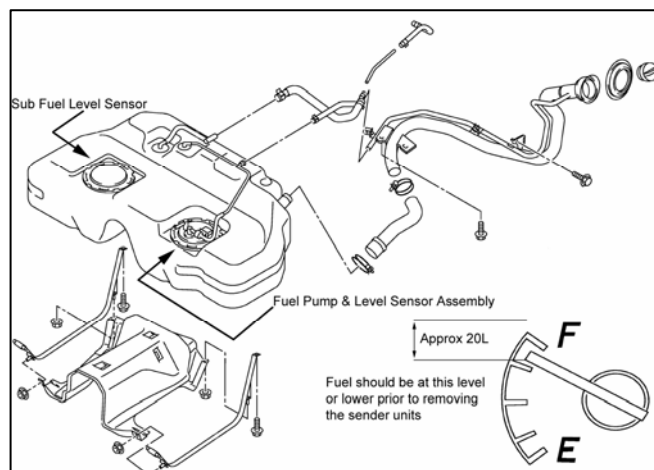
B – FUEL SYSTEM

1. Fuel Tank

The Fuel Tank design in Z50 is very similar to what is found in T30 & Z33.

The Tank is made of a plastic material & has an 82L capacity.

The shape of the tank is a saddle design due to the propeller shaft running up the centre of the vehicle for the rear drive. This creates the need for a “Jet Pump” system to pump over trapped fuel to where the main pump is located.

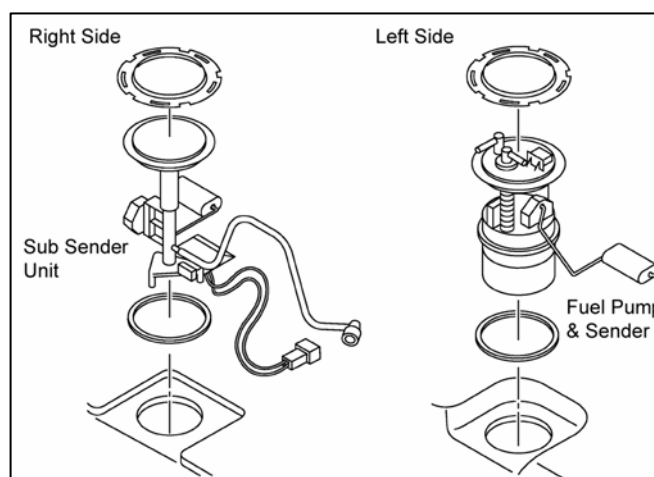


2. Fuel Senders & Pump

Due to above described saddle type tank design, 2 x Fuel sender units are utilised. They are wired in series in order to show an average of the amount of fuel in the tank.

There is only 1 Fuel pump in the Tank. Fuel trapped in the other bowl is pumped over via the Jet Pump.

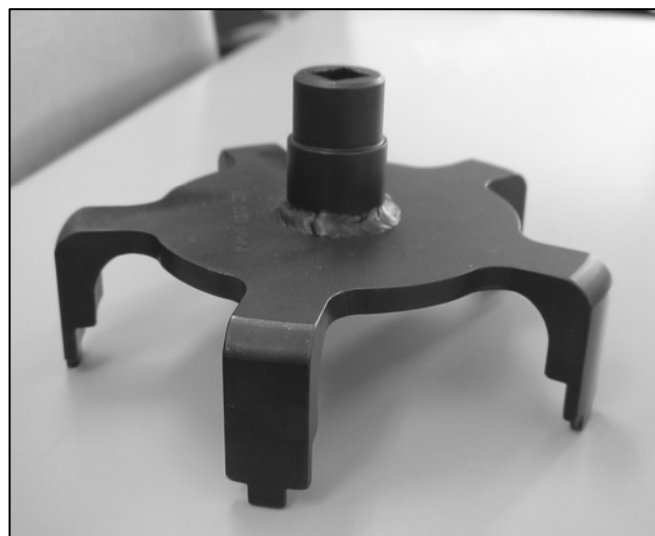
Refer to notes supplied at SM & TD Training for discussion on Jet Pump systems.



3. Special Service Tool

For the removal of the sender units, a new SST is required.

The assistance of a 2nd person will be required for the use of the Tool. Whilst using the tool to turn it with a ½ inch drive breaker bar the 2nd person should apply a downward pressure on it (by standing on it) to ensure it won't jump out of the notches.



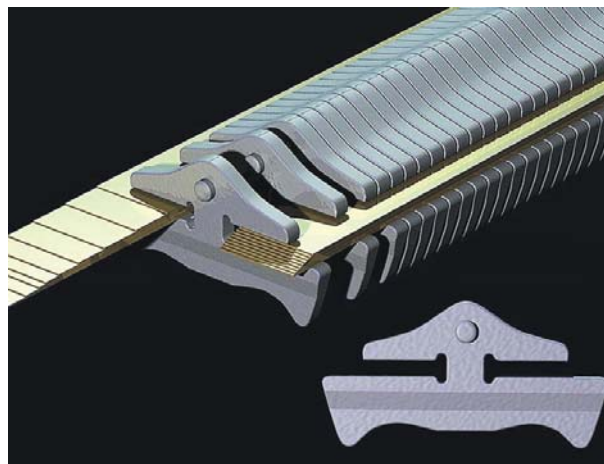
C – CVT AUTOMATIC TRANSMISSION

CVT – CONTINUOUSLY VARIABLE TRANSMISSION – RE0F09A

An “EXTRONIC” CVT type Automatic Transmission is the only transmission option available for Z50. The RE0F09A is an all new type of transmission that will soon be made available in other models such as '06 MY J31 Maxima due to it's efficient operation being able to offer improved fuel economy & cleaner exhaust emissions.

Z50 is not the 1st Nissan vehicle in Australia to have the availability of a CVT. In 1994 Nissan released the K11 Micra which also had a CVT. The major difference with this transmission was the torque converter design. The K11 utilised a Powder Clutch type of converter unit. It was filled with powdered metal filings and a variable current was applied to the unit which in turn solidified the powder & in turn connected drive from the engine to the transmission.

The torque converter unit in the Z50 is of the same construction found in conventional automatic transmissions.



Characteristics

| Item | Description |
|------------------------------|---|
| Improved shifting feel | <ul style="list-style-type: none"> - Use of a steel belt and pulley for the continuously variable transmission structure - Full electronic shifting control - Addition of a system for integrated control (CAN communications control) of the engine and CVT |
| Improved driving performance | <ul style="list-style-type: none"> - Use of a super-flat torque converter - Addition of manual mode functions |
| Improved fuel consumption | <ul style="list-style-type: none"> - Wide gear range and wide lock-up range - Continuously variable transmission structure incorporating electronic control |
| Improved serviceability | <ul style="list-style-type: none"> - Compatibility with the CONSULT-II electronic system diagnosis tester |



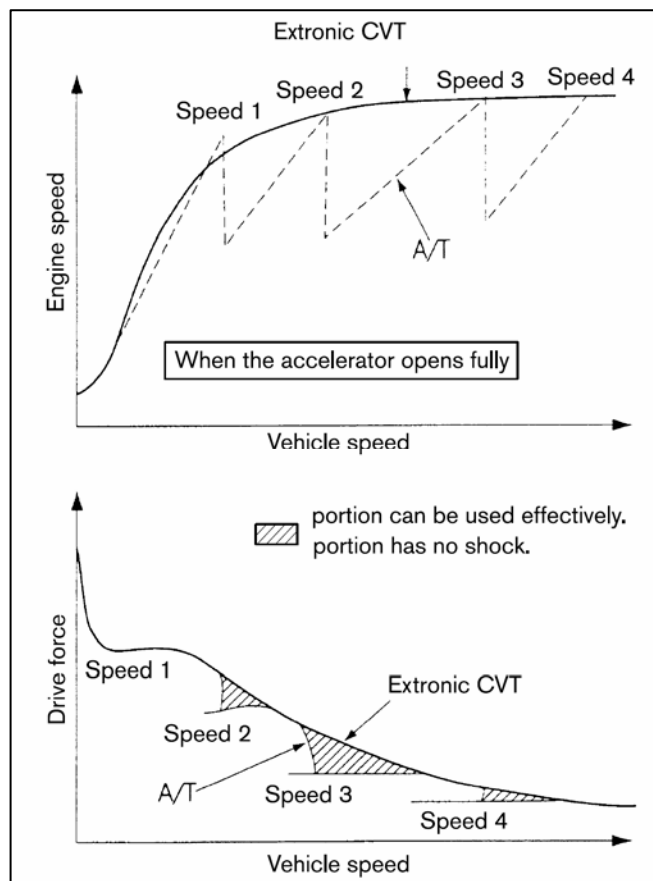
C – CVT AUTOMATIC TRANSMISSION

1. Stepless Gear changes

These graphs show the maximum drive force, indicating dynamic performance.

With a conventional A/T, the shifting steps result in the stepped production of drive force when the throttle is wide open.

With the CVT, it allows the engine high-output range to be maintained during acceleration, producing smooth changes during drive force. For this reason, the CVT experiences no loss of drive force in the shaded areas of the graph, and it delivers smooth driving that is free of shift shock.



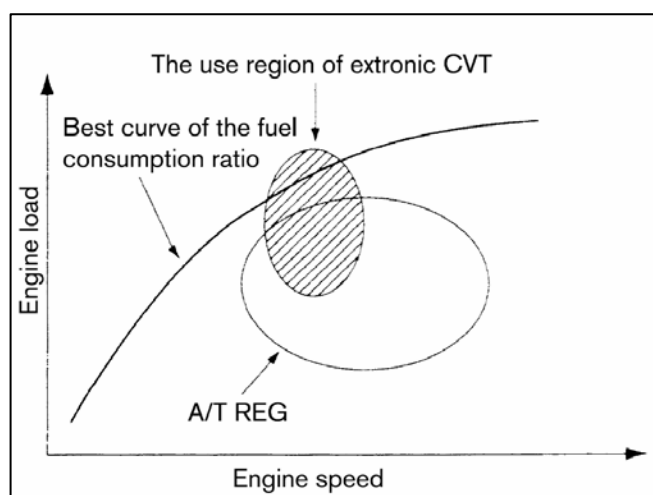
2. Torque Converter

The use of a torque converter improves starting acceleration performance.

In addition the special torque converter creep characteristics improve driving performance at low speeds and they reduce the unfamiliar feeling that drivers may feel when changing from a conventional A/T vehicle to a CVT vehicle.

The torque converter allows the high fuel efficiency engine ranges to be used for driving, improving practical fuel consumption.

The torque converter lock-up speed has been lowered (the lock-up range has been expanded). This reduces slip loss and it also expands the fuel-cut range during driving when the accelerator pedal is released, improving fuel economy.





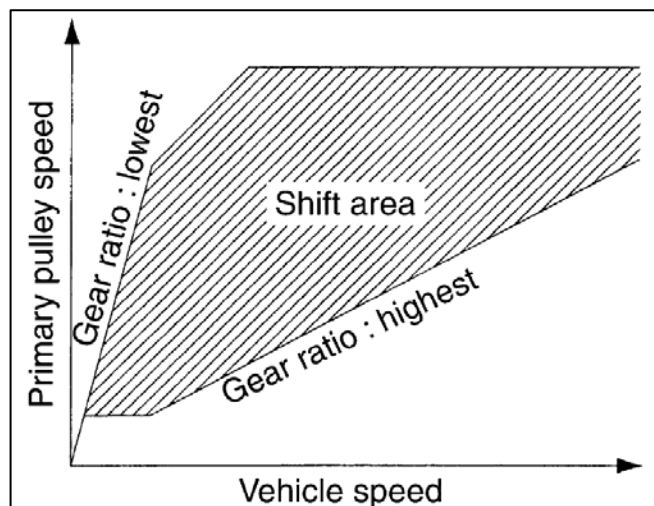
C – CVT AUTOMATIC TRANSMISSION

3. "D" Position

Shifting is possible over all the ranges of gear ratios from the lowest to the highest.

Low gear ratio: 2.371:1

High gear ratio: 0.439:1

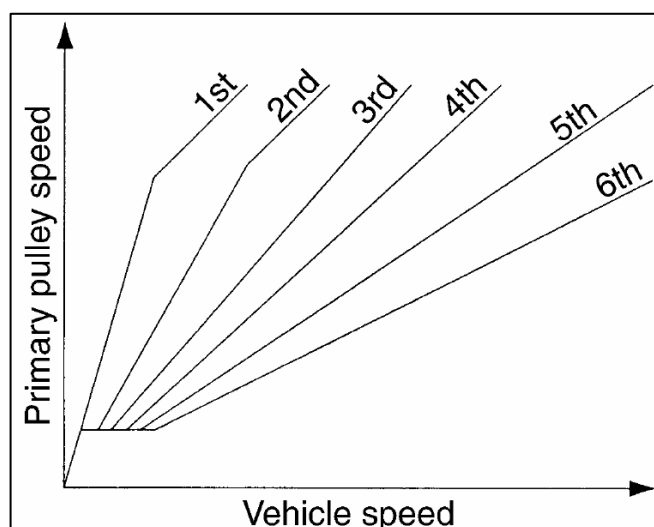


4. "M" Position

6 separate forward gear positions can be selected.

When the selector lever is put in the manual shift gate position, the fixed gear line is set.

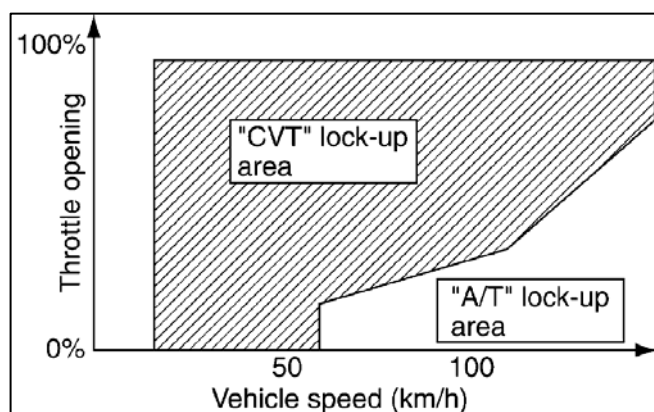
By moving the selector lever to + or -, the manual mode switch is changed over and shift change like a M/T becomes possible by following the gear set line step by step.



5. Lock-up Range

The torque converter clutch piston in the torque converter is engaged to eliminate torque converter slip to increase power transmission efficiency.

The lock-up applied gear range was expanded by locking up the torque converter at a lower vehicle speed than conventional AT models.





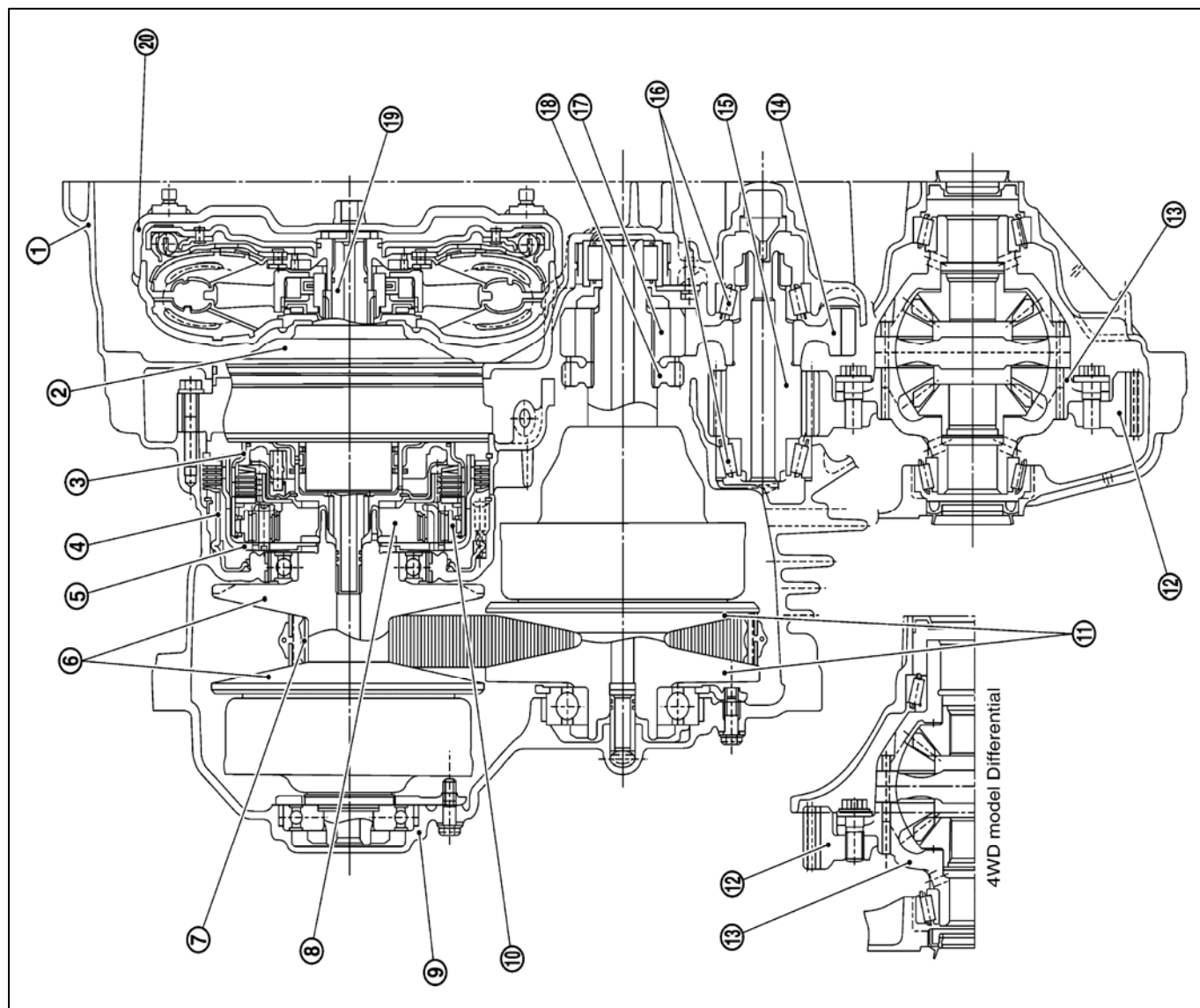
C – CVT AUTOMATIC TRANSMISSION

| | | |
|-------------------------|-------------|--|
| Applied model | | VQ35DE engine |
| | | AWD |
| CVT model | | RE0F09A |
| Transmission gear ratio | D range | Variable |
| | Reverse | 1.766 |
| | Final drive | 5.173 |
| Transmission Fluid Type | | NISSAN CVT fluid NS-2 DO NOT USE ANY OTHER TYPE |
| Fluid capacity | | 9.8 liter (8-3/4 Imp qt) |

SPECIAL PRECAUTIONS

- **ONLY USE GENUINE NISSAN NS-2 CVT FLUID IN THIS TRANSMISSION.**
- **NEVER “PUSH or TOW START” A CVT EQUIPPED VEHICLE.** If this occurs, transmission damage will result.
- Do NOT use any other fluid in this transmission such as NISSAN MATIC J or other Non Nissan brand of fluids.
- Do NOT use Nissan NS-2 Fluid in any other transmission. NS-2 is ONLY designed for the **RE0F09A** Transmission.
- Do NOT Blend or mix NS-2 fluid with any other Automatic Transmission Fluid.
- The Transmission is **NOT ABLE TO BE OVERHAULED**. Once it is confirmed that a fault experienced with the transmission is mechanical / internal, a new transmission unit is to be ordered via normal parts channels. **KEEP TECHLINE INFORMED OF YOUR DIAGNOSIS ACTIVITIES AT ALL TIMES.**
- If the Transmission is to be replaced, ensure that a **NEW RADIATOR** is ordered as well. This is due to the possibility of foreign materials being caught in the cooler located in the bottom tank of the radiator. It's not possible to “Flush” the cooler in the Radiator. BUT YOU MUST FLUSH ALL OF THE OTHER COOLER TUBES / PIPES WITH A SUITABLE SOLVENT & COMPRESSED AIR!!!
- The CKPS (Crankshaft Position Sensor) **MUST BE REMOVED** from the transmission housing prior to removal of the transmission assembly.
- Do NOT reuse transmission fluid once it has been drained.
- When required, the Transmission unit is to be removed **TOGETHER WITH THE ENGINE ASSEMBLY**. Carefully follow the directions in the Service Manual.
- Each Transmission is installed with it's own Fluid Level Gauge. It is secured into place via a unique locking tab arrangement. Take care NOT TO DAMAGE it when removing.
- The TCM is separate to the Transmission assembly. If for any reason a new or another Transmission is to be installed to the vehicle, a special “EEPROM erasing” procedure needs to be followed.
- Replacement of the fluid is NOT a simple matter of removing the Drain Plug from the Transmission & draining it. Follow the recommended procedure outlined in the ESM. Refer to Section C – CVT “CHANGING A/T FLUID”. Remember to clear the Fluid Deterioration Date in Work Support with **48 CONSULT II**

C – CVT AUTOMATIC TRANSMISSION

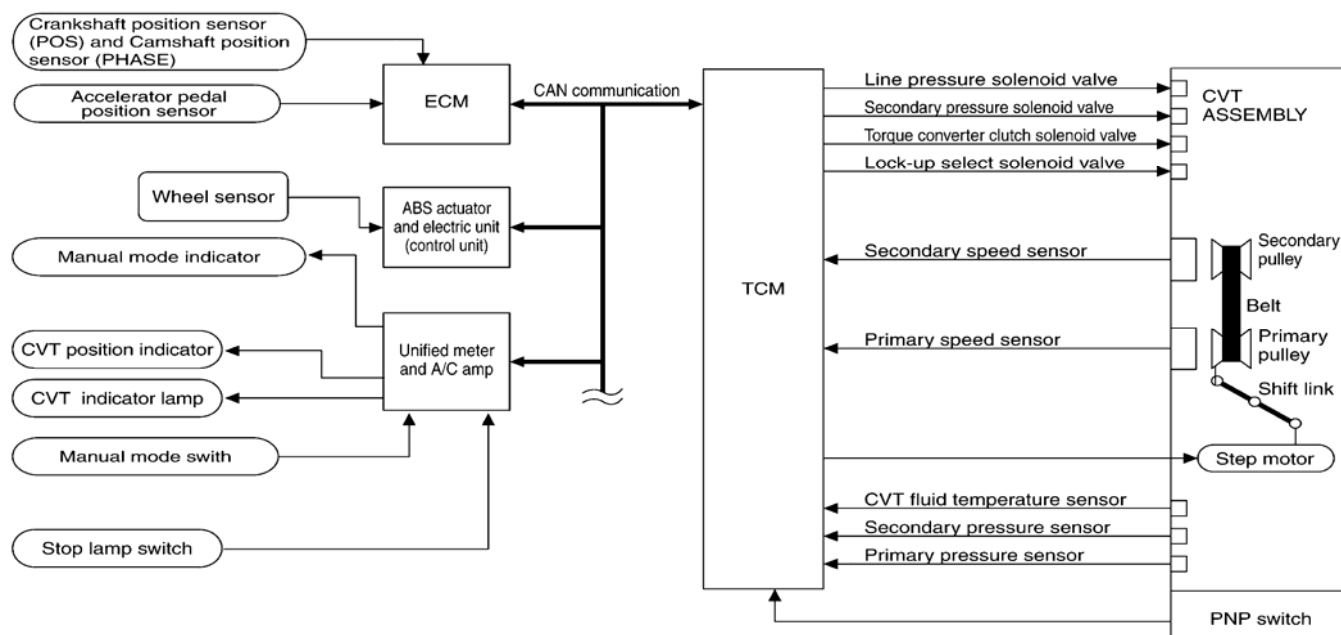


| | | |
|--------------------------|----------------------|--------------------|
| 1. Converter housing | 2. Oil pump | 3. Forward clutch |
| 4. Reverse brake | 5. Planetary carrier | 6. Primary pulley |
| 7. Steel belt | 8. Sun gear | 9. Side cover |
| 10. Internal gear | 11. Secondary pulley | 12. Final gear |
| 13. Differential case | 14. Idler gear | 15. Reduction gear |
| 16. Taper roller bearing | 17. Output gear | 18. Parking gear |
| 19. Input shaft | 20. Torque converter | |



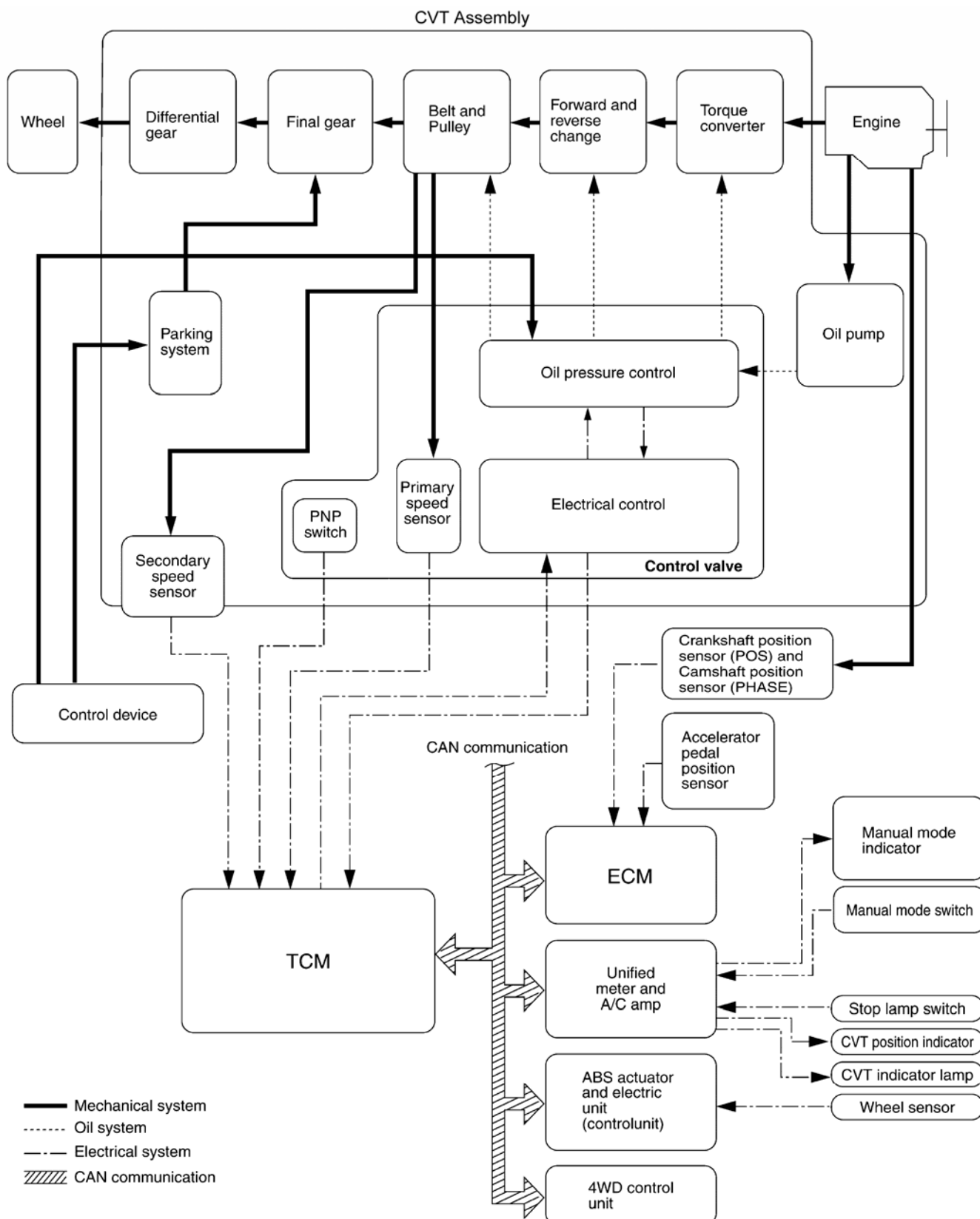
C – CVT AUTOMATIC TRANSMISSION

| INPUT | TCM FUNCTION | OUTPUT (ACTUATOR) |
|--|----------------------------|--|
| BATTERY VOLTAGE (& GROUND) | | |
| IGNITION SWITCH ACTIVITY | | |
| * ACCELERATOR PEDAL ACTIVITY | SHIFT CONTROL | Step Motor |
| * ENGINE SPEED | LINE PRESSURE CONTROL | Lock-up Select Solenoid Valve |
| CVT FLUID TEMPERATURE | LOCK-UP SOLENOID | Line Pressure Solenoid Valve |
| PRIMARY SPEED SENSOR | ENGINE BRAKE CONTROL | Secondary Pressure Solenoid Valve |
| SECONDARY SPEED SENSOR | PRIMARY PRESSURE CONTROL | Torque converter clutch solenoid valve |
| * VEHICLE SPEED | SECONDARY PRESSURE CONTROL | Line pressure solenoid valve |
| * BRAKE PEDAL ACTIVITY | FAIL-SAFE CONTROL | A/T CHECK indicator lamp |
| GEAR LEVER POSITION (P/N) | DUET EA CONTROL | Starter relay |
| * GEAR LEVER POSITION (Manual Mode) | ON BOARD DIAGNOSIS | |
| PRIMARY PRESSURE SENSOR | | |
| SECONDARY PRESSURE SENSOR | | |
| (* CAN COMMUNICATION) | | |



C – CVT AUTOMATIC TRANSMISSION

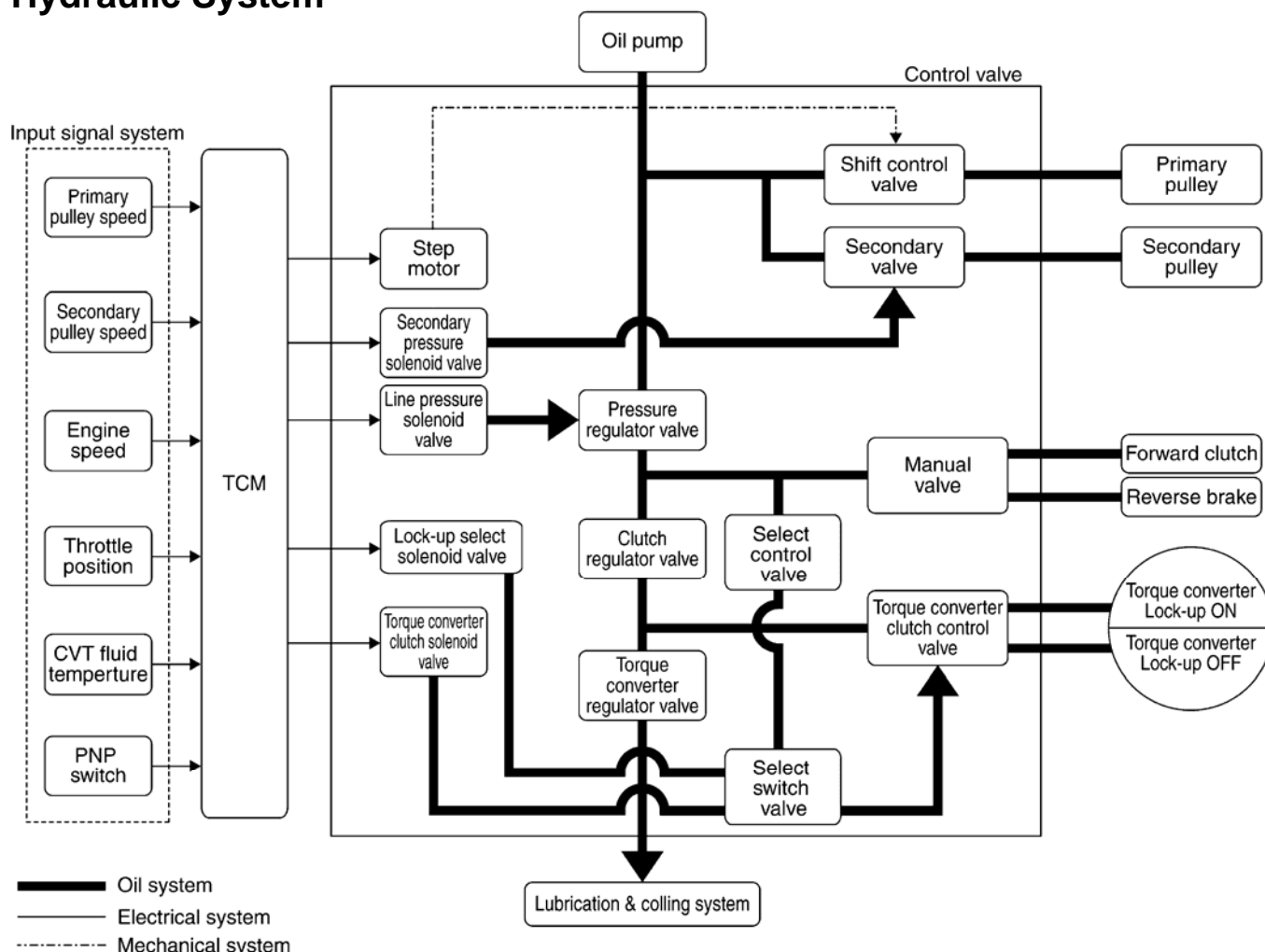
Overall Function





C – CVT AUTOMATIC TRANSMISSION

Hydraulic System



SPECIAL PRECAUTIONS

• ONLY USE GENUINE **NISSAN NS-2** CVT FLUID IN THIS TRANSMISSION.

• Do NOT use any other fluid in this transmission such as NISSAN MATIC J or other Non Nissan brand of fluids.

• Do NOT use Nissan NS-2 Fluid in any other transmission. NS-2 is ONLY designed for the **RE0F09A** Transmission.

• Do NOT Blend or mix NS-2 fluid with any other Automatic Transmission Fluid.

• Replacement of the fluid is NOT a simple matter of removing the Drain Plug from the Transmission & draining it. Follow the recommended procedure outlined in the ESM.

Refer to Section C – CVT “CHANGING A/T FLUID”. Remember to clear the Fluid Deterioration Date in Work Support with CONSULT II.

C – CVT AUTOMATIC TRANSMISSION

1. Torque Converter

The torque converter transmits engine torque to the transmission from the engine using the same method as the conventional automatic transmission.

When re-installing the Transmission, take special note of the Torque Converter mounting. Instead of captive nuts being welded onto the converter, there are 4 x threaded studs welded to it instead.

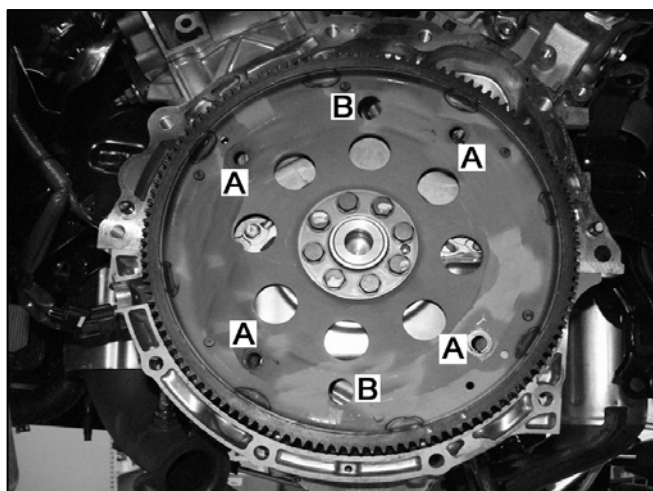
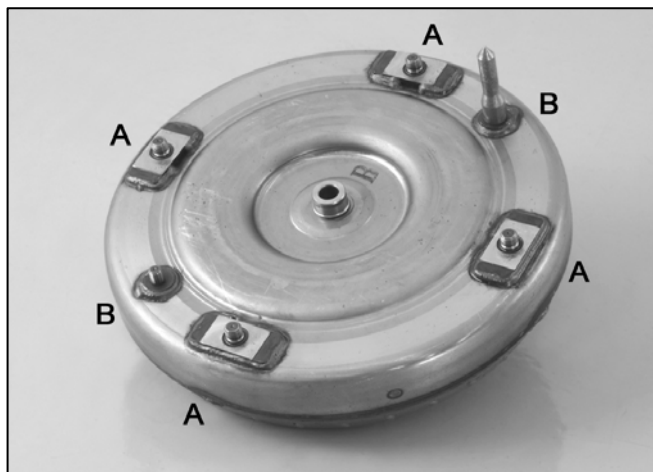
Ensure the studs on the Torque Converter go through the 4 designated holes on the Engine Drive Plate so the nut can be attached to the stud in order to secure to converter onto the drive plate correctly.

To facilitate this installation process, a special tool has been developed.

Attach the tool to either position marked as "B" (refer to adjacent picture) on the converter. Ensure the position of the converter places the tool at the lowest point possible so that when the transmission assembly is introduced to the engine, the tool will find 1 of the 2 holes on the drive plate which also should be at the lowest point.

The holes in the Drive plate marked "B" are larger than the holes marked "A"

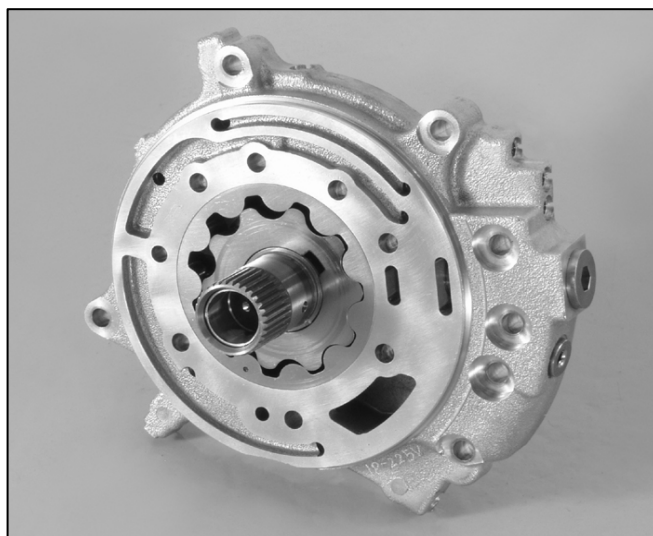
Once the transmission is in place, the tool can be removed by un-screwing it from the thread on the converter & simply pulling it through the hole. Refer to STB **GI 05-012** for more information about this SST.



2. Oil Pump

The oil pump is the trochoid type, and it is directly driven by the engine. This pump has a flow control valve that ensures the optimum amount of fluid is supplied for both the high and low engine speed zones.

The oil discharged from the oil pump is used to operate the primary and secondary pulleys and the hydraulic clutches, and it is used as lubrication for various parts.

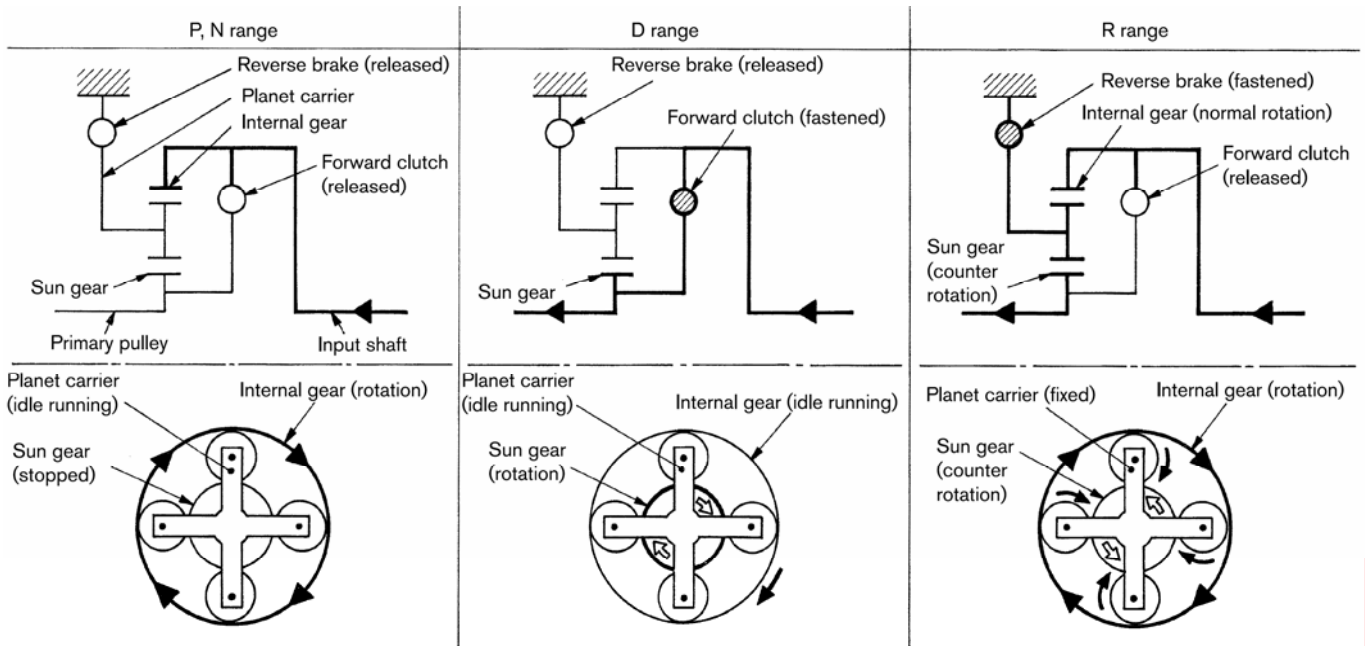


C – CVT AUTOMATIC TRANSMISSION

3. Forward / Reverse Gear Mechanism

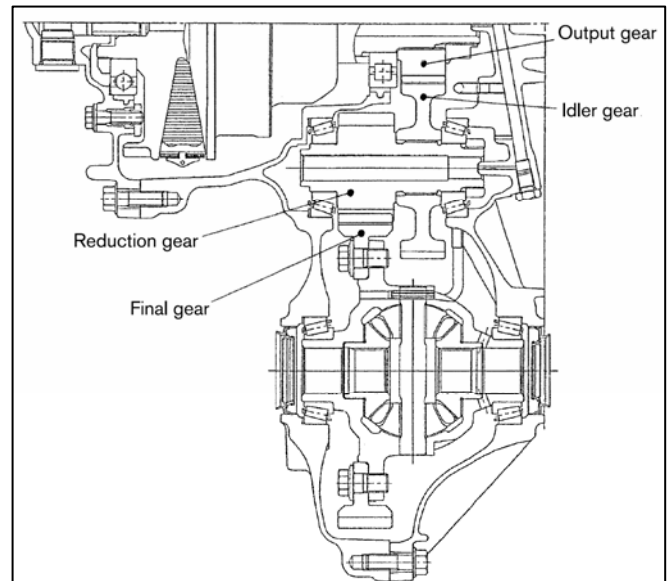
A planetary gear type forward/reverse gear mechanism has been adopted between the torque converter and the primary pulley.

The power from the torque converter is transmitted to the input shaft, and it activates the wet type multiple disc clutch to shift gears between forward and reverse.



4. Final drive and differential

The final drive consists of the primary reduction area (output gear and idler gear) and the secondary reduction area (reduction gear and final gear). Helical gears are used for all of them.



C – CVT AUTOMATIC TRANSMISSION

5. Belts and Pulleys

The main component consists of a pair of pulleys that can freely change the groove width and a steel belt lined with steel pieces that have multi-layered steel ring guides.

In accordance with the radius of the pulleys and the steel belt, changes are made continuously from a low gear (gear ratio: 2.371) to an overdrive zone (gear ratio: 0.439).

The pulley groove width is controlled by the hydraulic pressure.

6. Steel Belt

The steel belt consists of approximately 400 steel pieces and 2 steel ring guides made up of 12 layers.

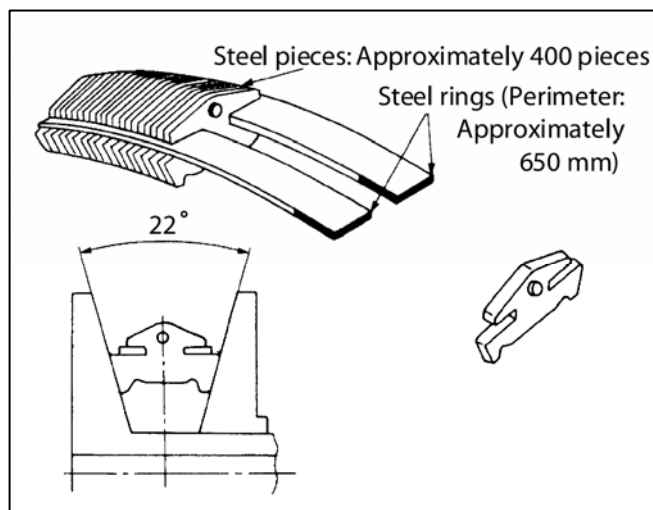
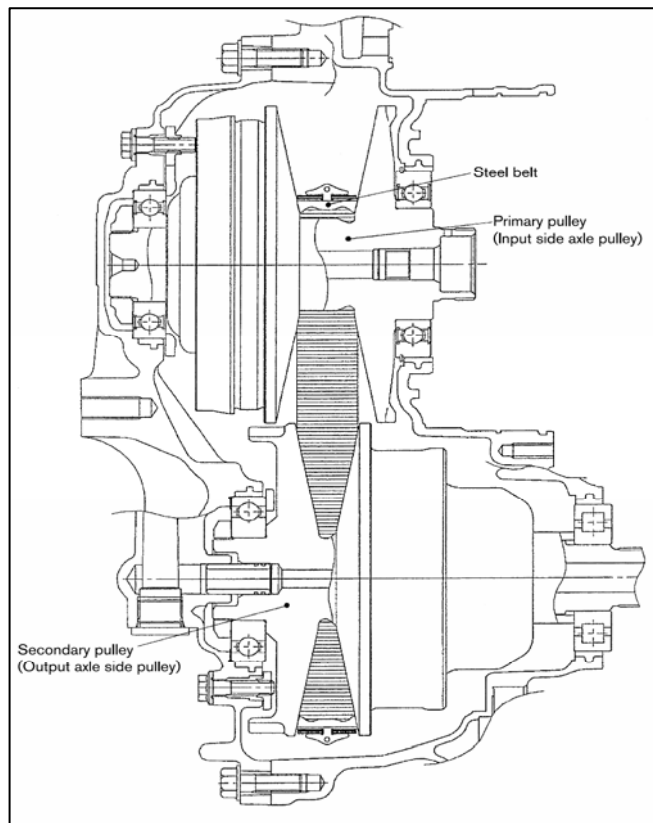
The characteristic of the steel belt is that it transmits power by compression (pushing) of the steel pieces while rubber belts for example transmit power by a pulling tension.

In order for the steel pieces to transmit power, friction force is required between the steel pieces and the inclined surfaces of the pulley. Friction force is generated in the following manner:

- The secondary pulley receives hydraulic pressure and catches the steel pieces.
- The steel pieces are pushed outward.
- The steel rings try to stay in place.
- Tension is generated in the steel rings.
- The primary pulley catches the steel pieces on their sides.
- Friction force is generated between the steel belt and the pulley.

The steel pieces transmit power by compression, and the steel rings maintain the required friction force.

Therefore the tension of the steel rings is dispersed, fluctuations by stress are low and excellent durability is achieved.



C – CVT AUTOMATIC TRANSMISSION

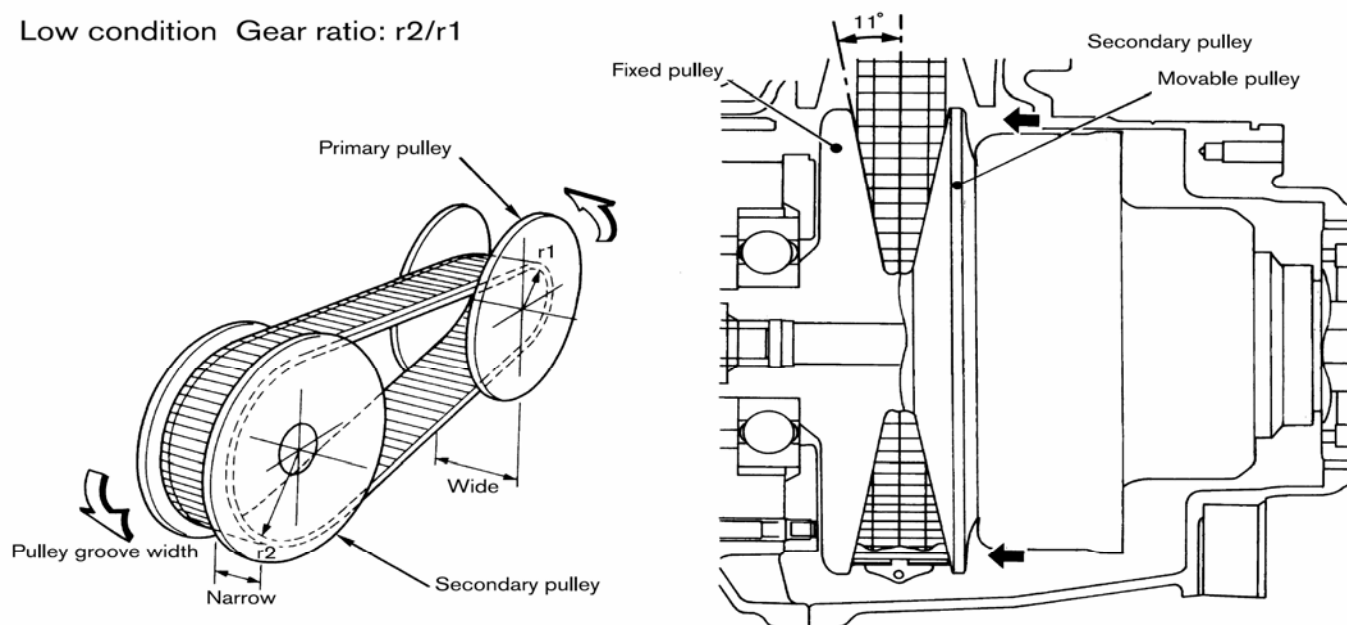
7. Pulley

The primary and secondary pulleys have a fixed and a movable pulley respectively, with inclined surfaces of 11 degrees. A hydraulic chamber (primary or secondary) is provided in the back of each movable pulley.

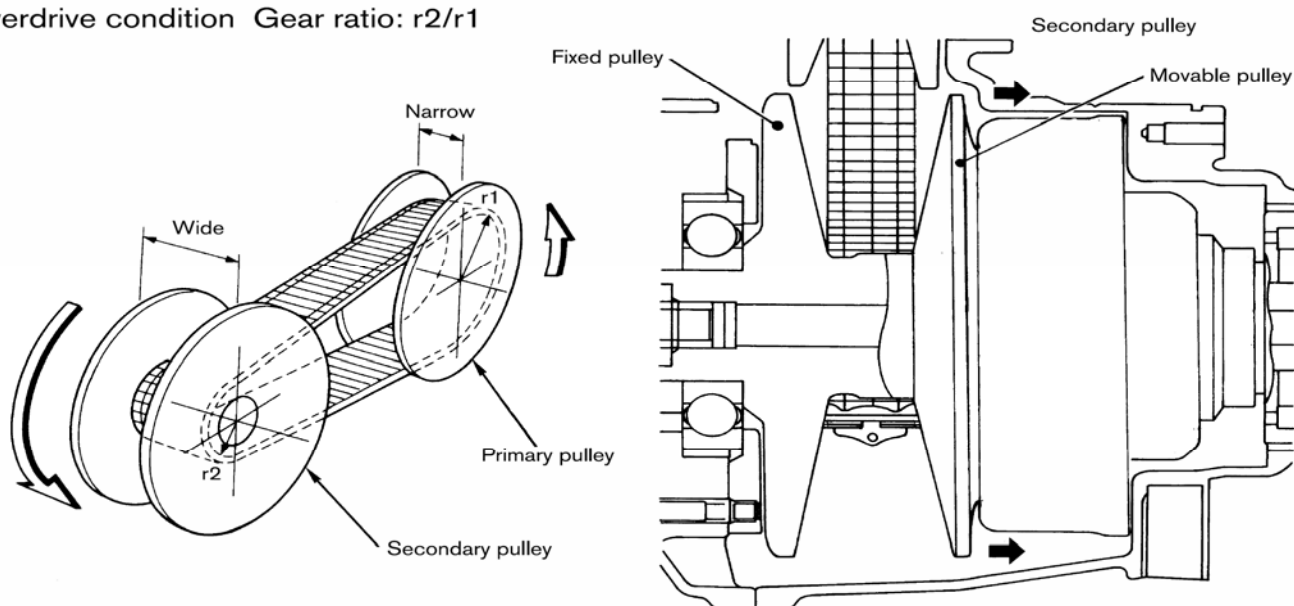
The movable pulleys can slide on the shaft by the ball spline. They change the groove widths of the pulleys.

Based on the input signals of the engine load (throttle valve opening) and rotation speeds of the primary and secondary pulleys (vehicle speed), the operating pressures of the primary and secondary pulleys are changed to control their groove widths.

Low condition Gear ratio: r_2/r_1

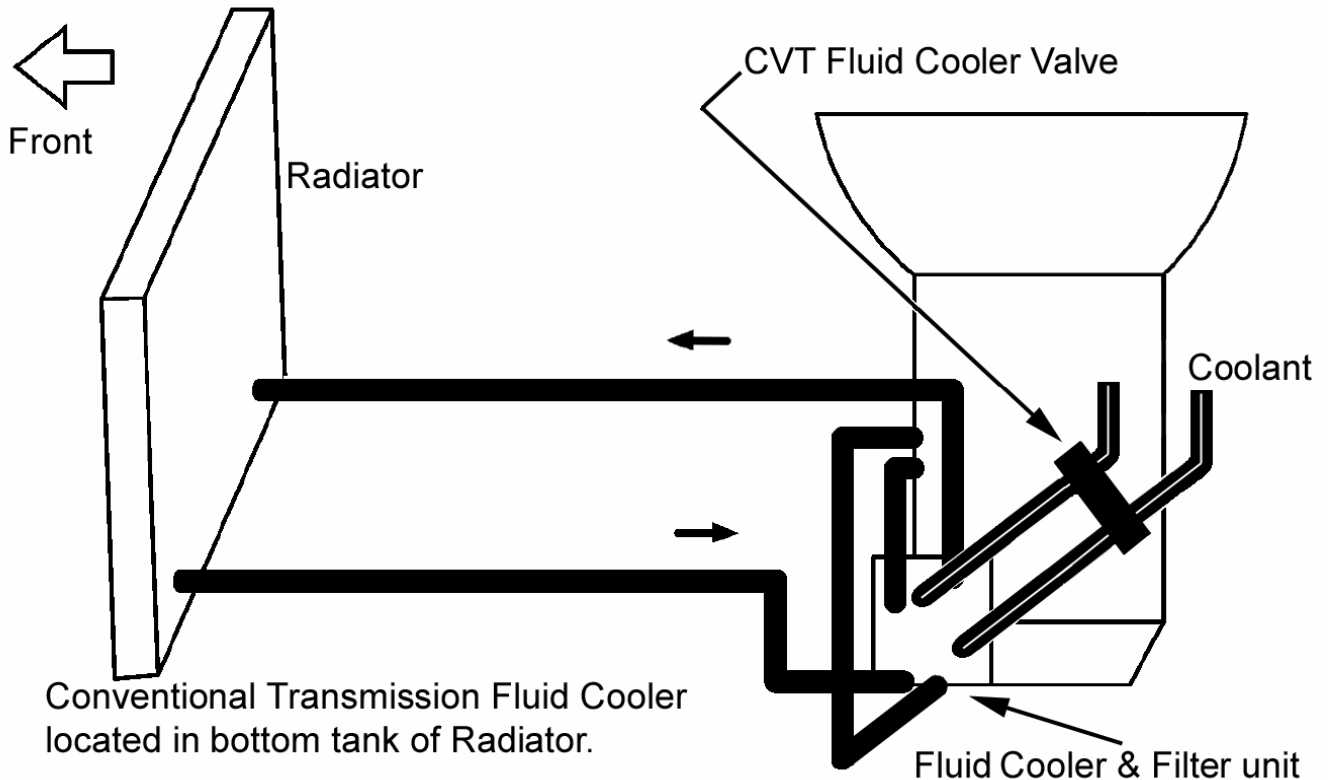


Overdrive condition Gear ratio: r_2/r_1



C – CVT AUTOMATIC TRANSMISSION

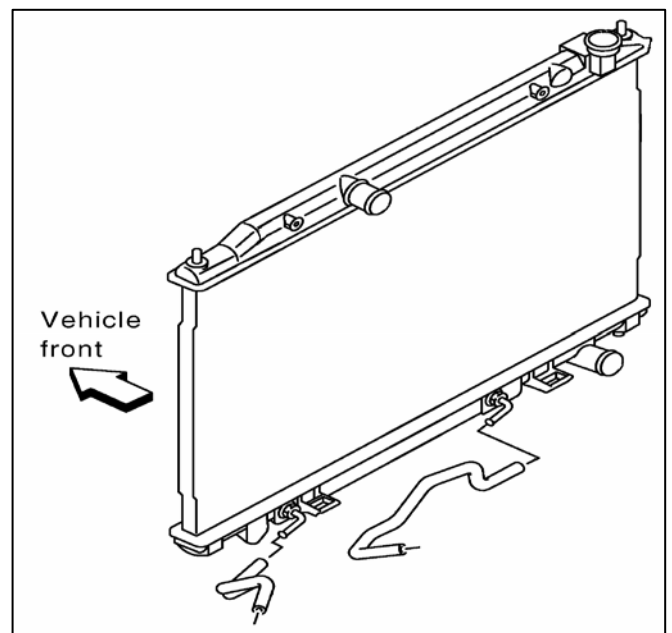
CVT Fluid Cooling & Filtration



1. Fluid Cooler in Radiator

A conventional style of Fluid Cooler unit is located in the bottom tank of the radiator.

If there is a transmission failure & foreign materials are found in the fluid, the **COMPLETE RADIATOR IS TO BE REPLACED**. It cannot be flushed.

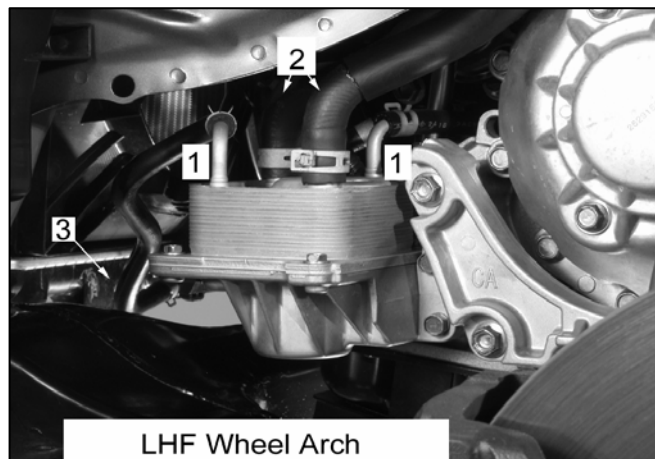


C – CVT AUTOMATIC TRANSMISSION

2. Transmission Mounted CVT Fluid Cooler & Filter Unit

In addition to fluid flowing through a cooler in the bottom tank of the radiator to be cooled, the fluid also flows through another unit which is attached to the Transmission assembly. This unit also has engine coolant flowing through it in order to either cool or warm the fluid as well.

1. Transmission Fluid Hoses.
2. Coolant Hoses.
3. Base of Radiator housing the main Fluid Cooling unit.



LHF Wheel Arch

3. CVT Fluid Cooler Valve

Engine coolant is supplied through CVT fluid cooler valve to CVT oil cooler.

The Valve is a thermostatically controlled only. It does not have an electrical operation.

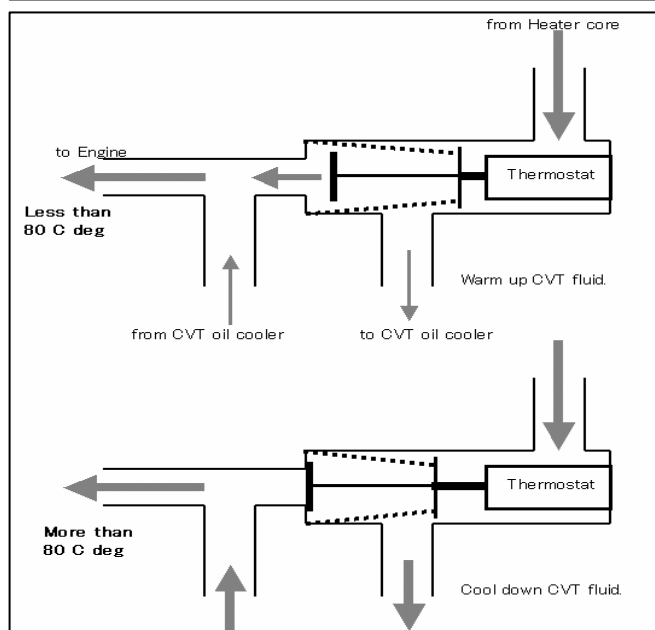
Before the engine warms up, engine coolant is not supplied to CVT cooler to shorten the engine warming up time.

After engine has warmed up, hot coolant is supplied to CVT cooler and to warm up the CVT fluid.

If CVT fluid temperature gets to be higher than engine coolant temperature, it is cooled down by engine coolant.



Top of Transmission



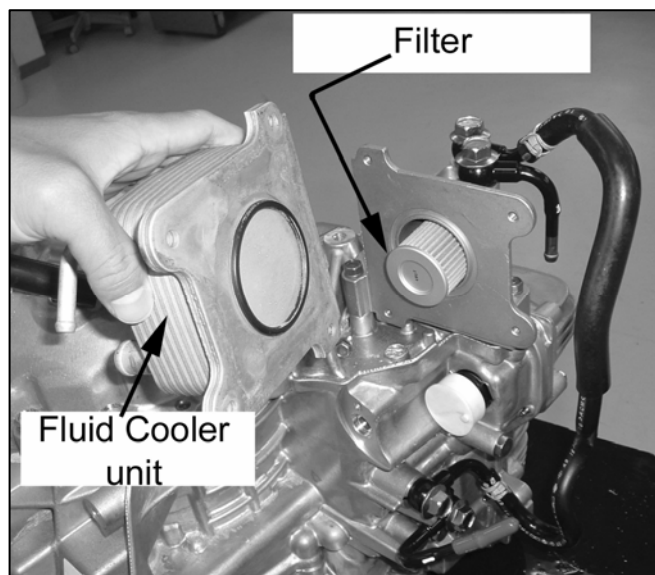
C – CVT AUTOMATIC TRANSMISSION

4. CVT Fluid Filter

Once the Transmission fluid has exited the transmission unit and travels to both of the previously discussed coolers, the fluid is also filtered by the round shaped filter assembly shown right.

THIS FILTER DOES NOT NEED TO BE REPLACED DURING NORMAL SERVICE.

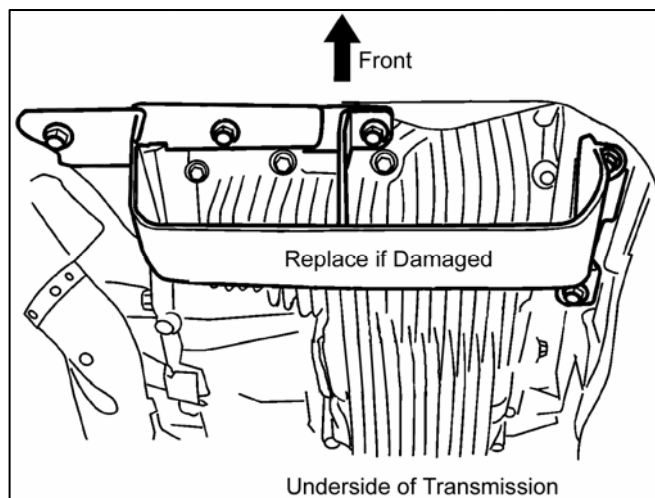
The filter is located in the transmission mounted Fluid Cooler unit.



5. External “Air to Transmission” Cooler

At the front of the vehicle on the underside is an “Air-Scoop” like assembly which is designed to direct air onto the underside of the Transmission Assembly. There are fins cast into the alloy housing of the transmission which are designed to radiate heat away from the Transmission unit.

Air directed towards the fins due to the fitment of the air scoop can quickly take away the radiated heat. During routine maintenance, ensure the air scoop is not damaged in anyway.





C – CVT AUTOMATIC TRANSMISSION

Fail Safe Modes

1. Secondary Pulley Speed Sensor

In the event the TCM receives an abnormal signal from the secondary pulley speed sensor, it will control gear ratio according to accelerator pedal position.

2. Primary Pulley Speed Sensor

In the event the TCM receives an abnormal signal from the primary pulley speed sensor, it controls gear ratio according to accelerator pedal position and secondary pulley speed (vehicle speed). The TCM terminates second mode and controls the CVT as though it is in 'D' range.

3. Inhibitor Switch

In the event the TCM receives an abnormal signal from the inhibitor switch, it controls the CVT as though it is in 'D' range. If the TCM is unable to identify 'P' or 'N' positions, the engine cannot be restarted after it has been turned off. Engine torque is limited to less than 100 Nm. to prevent excessive pressure from being applied to the steel belt.

4. Oil Temperature Sensor

In the event the TCM receives an abnormal signal from the oil temperature sensor, it maintains the gear ratio at the range applied just prior to the malfunction being detected, based on current driving condition. Engine speed is limited to less than 5000 rpm.

5. Secondary Oil Pressure Sensor

In the event the TCM receives an abnormal signal from the secondary oil pressure sensor, it terminates feedback control of secondary oil pressure. Engine torque is limited to less than 100 Nm.(73 ft.-lbs.), to prevent excessive pressure from being applied to the steel belt. The TCM maintains normal gear ratio control.

6. Line Pressure Solenoid

In the event the TCM detects abnormal operation of the line pressure solenoid, it switches the line pressure solenoid OFF to provide maximum line pressure to the hydraulic circuits. The TCM maintains normal gear ratio control.

7. Secondary Pressure Solenoid

In the event the TCM detects abnormal operation of the secondary pressure solenoid, it switches the secondary pressure solenoid OFF to maintain maximum secondary piston pressure. While operating in this mode, the TCM only changes the gear ratio to a lower gear (higher gear ratio).

8. Lock-up Solenoid

In the event the TCM detects abnormal operation of the lock-up solenoid, it switches the lock-up solenoid OFF to disengage the lock-up clutch.

9. Stepper Motor

In the event the TCM detects abnormal operation of the stepper motor, it terminates the output signal to the stepper motor and maintains the gear ratio at the range applied just prior to the malfunction being detected.

10. Lock-up Select Solenoid

In the event the TCM detects abnormal operation of the lock-up select solenoid, it switches the lock-up/select solenoid OFF to disengage the lock-up clutch. Shift shock will increase when shifting from N to D range.

C – CVT AUTOMATIC TRANSMISSION

Checking CVT Fluid Level & Condition

Please refer to the special procedure outlined in the Service Manual if you are checking the Transmission Fluid Level. ("Checking CVT Fluid" Section C – CVT). Check the fluid level when the Transmission is warm. Drive the vehicle in stop start conditions for 10 ~ 15 minutes. Fluid temp should be 50 ~ 80 deg C

Inspect the fluid for it's colour & unusual smell of the fluid (darkened brown / varnished colour & burned smell etc.) Also inspect for foreign materials in the fluid. (Clutch band & metallic materials)

It is **STRONGLY** advisable to replace the CVT fluid if it is discoloured or smells burnt.

Refer to the next page of this manual for more detail regarding fluid replacement

NOTE 1:

The fluid level gauge has a locking arrangement as shown right. Take care not to damage it when removing the gauge.

NOTE 2:

Take note of the **CHECKING POSITION** of the gauge as shown right in the diagram.

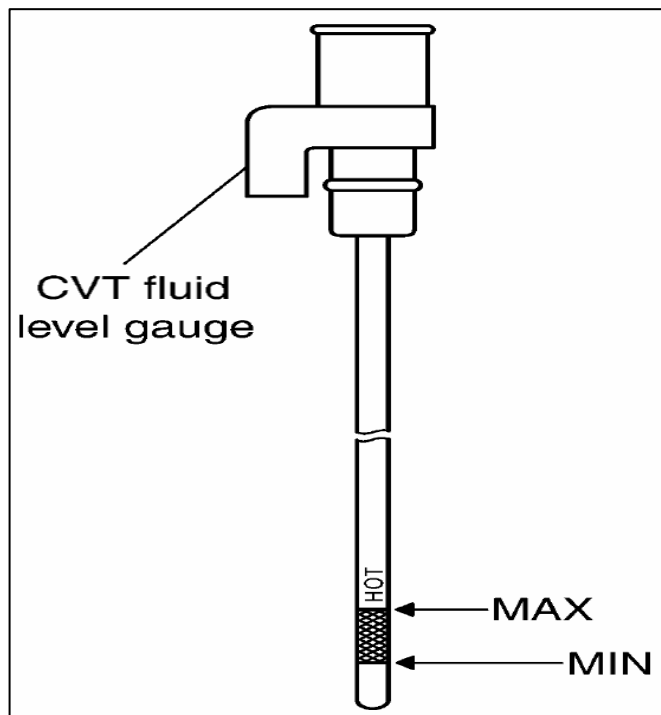
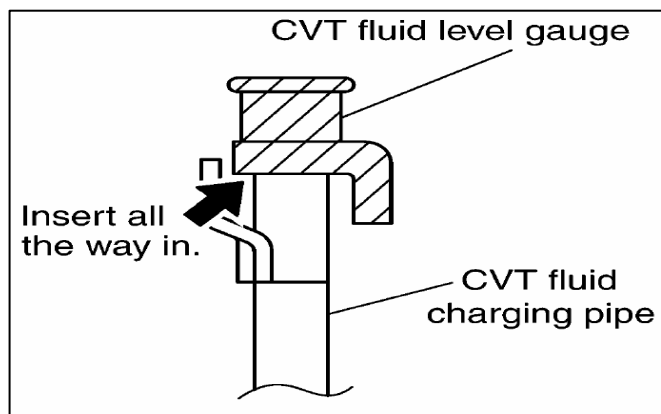
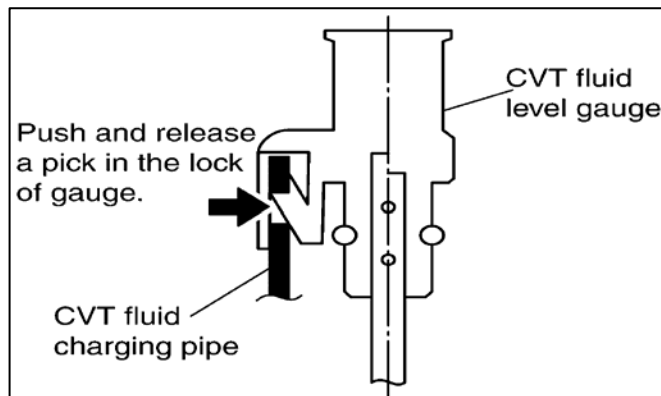
If the gauge is in the **NORMALLY LOCKED** position, the fluid level reading will be inaccurate. After releasing the lock, remove & wipe the gauge & re-insert 180 degrees from the original position.

NOTE 3:

Only use LINT FREE material to wipe the gauge with. Ordinary paper or cloth can leave small particles in the transmission which can interfere with it's operation.

NOTE 4:

Only use **Nissan NS-2** Transmission Fluid.





C – CVT AUTOMATIC TRANSMISSION

Changing CVT Fluid

Please refer to the special procedure outlined in the Service Manual if you are replacing the Transmission Fluid. ("Changing CVT Fluid" Section C – CVT).

It is recommended that the fluid is replaced under the following conditions;

1. If the vehicle is used for towing etc. check the "FLUID DETERIORATION RATE" with CONSULT II. If the figure is above 210000 replace the fluid as directed in the Service Manual & clear the value from the memory TCM using the CONSULT II.
2. When it is noted that the fluid is badly discoloured. Ensure that there are no other abnormalities with the transmission if this is the case though. Refer to section C – CVT; "Inspections Before Trouble Diagnosis. CVT FLUID CHECK"

When adding fluid to the transmission, remove the gauge in order to carefully add the fluid through the opening of the Level Gauge Tube.

NOTE 1:

Once the fluid has been replace, please ensure you clear the CVT FLUID DETERIORATION DATA to "0" with CONSULT II in Work Support.

NOTE 2:

It will NOT be necessary to replace the Transmission Fluid Filter when changing the CVT Fluid under normal circumstances.

The filter is located in the Fluid Cooler unit.

NOTE 3:

If there is a transmission failure or internal fault, the transmission is NOT OVERHAULABLE. It is to be replaced as a complete assembly. Ensure the "EEPROM erasing" procedure is carried out

NOTE 4:

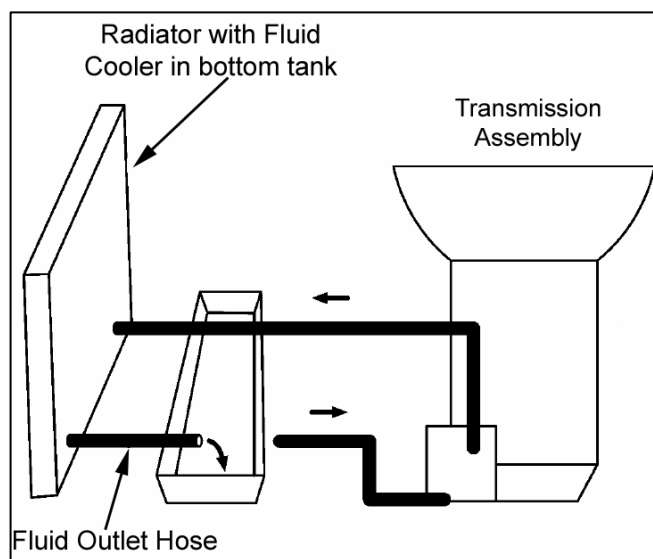
If the Transmission is to be replaced, ensure that no FOREIGN MATERIALS are left in the external cooler line circuit.

- FLUSH ALL OF THE TUBES / PIPES WITH A SOLVENT AND COMPRESSED AIR.
- REPLACE THE RADIATOR ASSEMBLY

NOTE 5:

Only use **Nissan NS-2** Transmission Fluid.

| | | | |
|----------------------------|------|-------|------|
| CONFIRM CVTF DETERIORATION | | | |
| CVTF DETERIORATION DATE | | | |
| 6 | | | |
| CLEAR | | PRINT | |
| MODE | BACK | LIGHT | COPY |





C – CVT AUTOMATIC TRANSMISSION

CONSULT II Work Support

1. Engine Brake Adjustment

This setting condition can be read in Work Support on CONSULT II. From factory this setting is ON & set to 0. It can be turned OFF all together or adjusted to increase the Engine Braking effect according to customer preference. Refer to section C – CVT “TROUBLE DIAGNOSIS - CONSULT-II Function” in the Service Manual for more detail.

2. CVT Fluid Deterioration Date

From new this setting will begin with a reading of 0. As time goes on & km's increase, this value also increases. Once it reaches 210000 – YOU MUST REPLACE THE TRANSMISSION FLUID.

The value is calculated by the TCM. The TCM monitors values such as speeds (engine & vehicle), temperatures (transmission), engine loads etc. It then gives the value that can be seen in Work Support with CONSULT II. The figure has no unit value.

- **CHECK THIS SETTING EVERY 100,000KM'S**

- Once the fluid has been replaced, clear the setting back to “0” using CONSULT II in Work Support

TCM &/or CVT Assembly Replacement Procedure

EEPROM ERASING PATTERNS

| CVT assembly | TCM | Erasing EEPROM in TCM | Remarks |
|--------------|--------------|-----------------------|--|
| Replaced | Replaced | Not required | Not required because the EEPROM in the TCM is in the default state. (CVT assembly must be replaced first.) |
| Not replaced | Replaced | Not required | Not required because the EEPROM in the TCM is in the default state. |
| Replaced | Not replaced | Required | Required because data has been written in the EEPROM in the TCM and because the TCM cannot write data from the ROM assembly in the transmission. |

Refer to the Service Manual section C – CVT “PRECAUTIONS”. Here the detailed procedure on how to carry out the above operation can be found.

THIS PROCEDURE IS SIMILAR TO THE PROCEDURE THAT NEEDS TO BE CARRIED OUT WHEN REPLACING THE TRANSMISSION ASSEMBLY IN A Y61 PATROL TB48DE

C – CVT AUTOMATIC TRANSMISSION

What's involved with Replacing the Transmission Assembly?

- The CVT CANNOT BE OVERHAULED. It has to be replaced as a complete unit. Once a complaint of CVT fault is verified, make sure you understand what caused the failure of the CVT. Don't just replace it because it seemed to have just failed for no reason. Also make sure the cause of the fault is not an externally influenced fault. E.G.:

- A faulty component or sensor which relates to CVT operation
- Bad ground connections &/or poor power supplies (remember, the Transmission relies HEAVILY on electrical activity)

KEEP TECHLINE INFORMED OF ALL YOUR ACTIVITIES INVOLVING CVT FAULTS.

- According to the Service Manual, the removal & re-installation process of the CVT will involve the removal of the Engine & CVT as 1 assembly. Once out of the vehicle, the 2 units can then be separated. Carefully follow the directions for CVT removal & re-installation outlined in the Service Manual. KEEP TECHLINE INFORMED OF ALL YOUR ACTIVITIES INVOLVING CVT FAULTS.

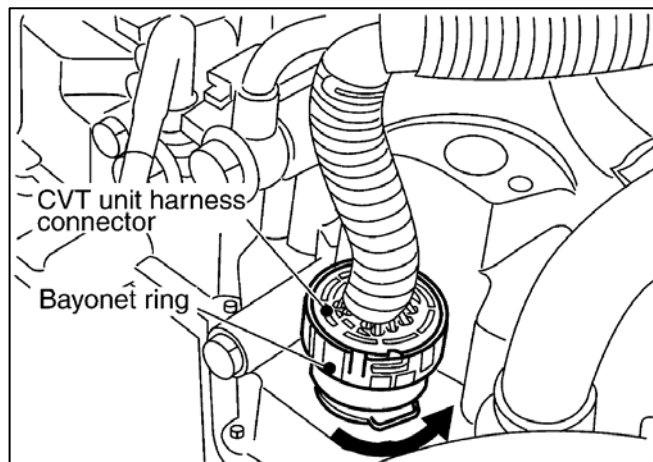
- If the failure of the CVT involved small metallic particles circulating around the lubrication circuit, you MUST REPLACE THE RADIATOR ASSEMBLY. The fluid cooler in the radiator CANNOT BE FLUSHED. But you can flush the cooler unit mounted on the transmission. Disassemble it, replace the small round filter & flush it with a suitable solvent & compressed air. Carry out the same actions with all of the hoses / pipes etc. that carry CVT fluid. KEEP TECHLINE INFORMED OF ALL YOUR ACTIVITIES INVOLVING CVT FAULTS.

- Once the new Transmission is installed, refer to The Service Manual section C – CVT "PRECAUTIONS - Erasing EEPROM in TCM". You cannot leave a new CVT unit communicating with the current TCM without informing the TCM that there is a whole new CVT in the vehicle. Poor driveability will otherwise result. KEEP TECHLINE INFORMED OF ALL YOUR ACTIVITIES INVOLVING CVT FAULTS.

- Given that there is a new CVT in the vehicle, that means there is new fluid in the CVT. Make sure you clear the 'FLUID DETERIORATION DATA' with CONSULT II in Work Support.

- Take extreme care with the main harness connector on the transmission (shown right). Refer to the Service Manual section C – CVT "PRECAUTIONS"

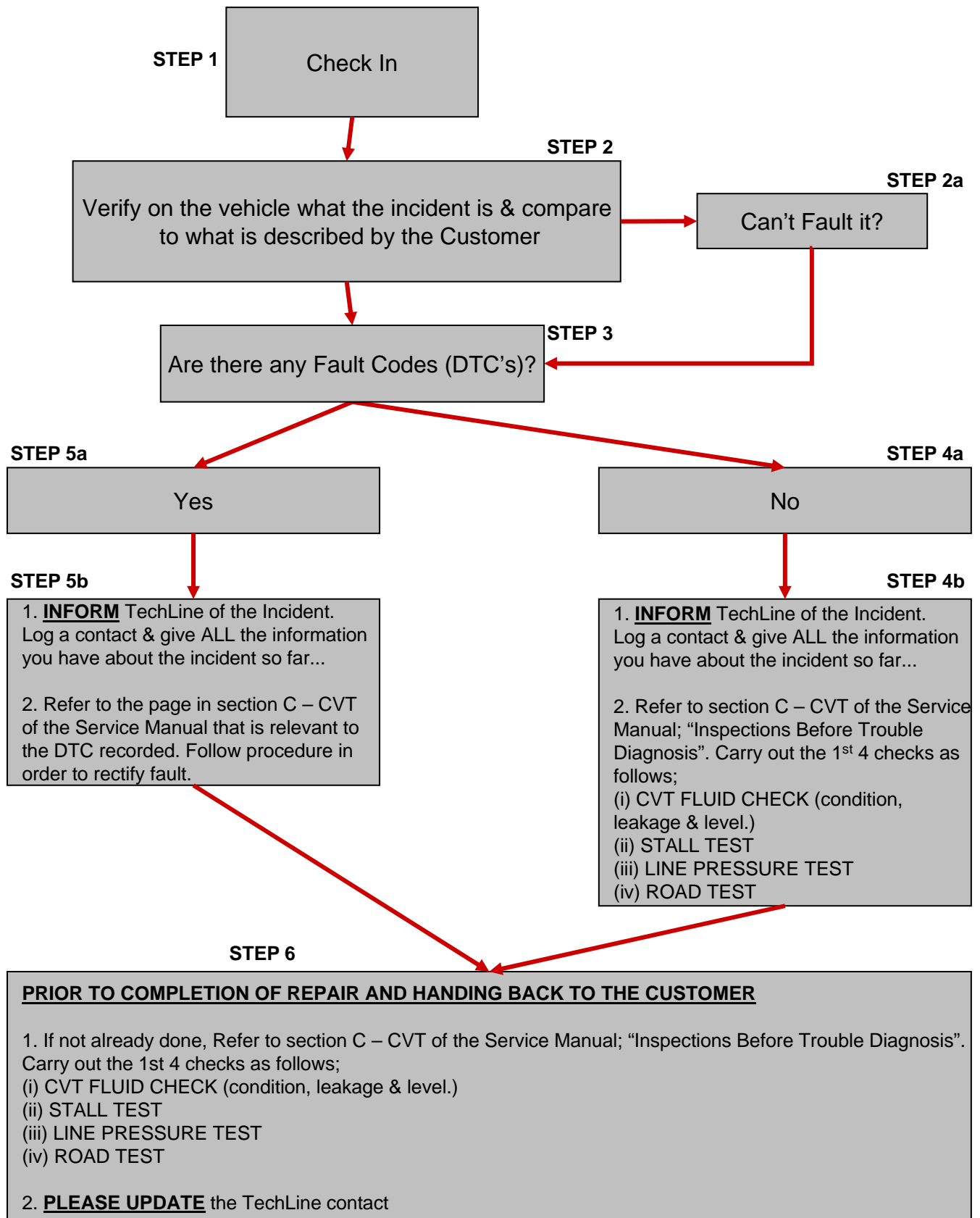
- Regardless of the fault, MAKE SURE ALL OF THE GROUND & POWER CONNECTIONS ARE OK. Remember that the operation of the transmission relies heavily on good clean & tight ground & power connections & a correctly functioning power supply system.





RE0F09A CVT Trouble Diagnosis

Basic Work Flow Chart



K – LIGHTING SYSTEM

Xenon Headlamps

Z50 Murano is fitted with High Intensity Discharge (HID) Xenon Headlights for both High & Low beams. A high-voltage transformer is mounted externally on each headlight assembly.

Instead of the filament of a halogen lamp, the arc tube (bulb) is filled with xenon (Xe) gas.

By applying high voltage, an arc discharge occurs, which causes light emission.

Xenon lamps emit a large amount of white light similar to sunlight, thus, bright and natural visibility can be obtained.



Summary of Xenon Light Advantages

- The light produced by the headlamps is white colour similar to sunlight that is easy to the eyes.
- Light output is nearly double that of halogen headlamps, affording increased area of illumination.
- Counter-reflected luminance increases and the contrast enhances on the wet road in the rain. That makes visibility go up more than the increase of the light volume.
- Power consumption is approximately 25 percent less than halogen headlamps, reducing battery load.

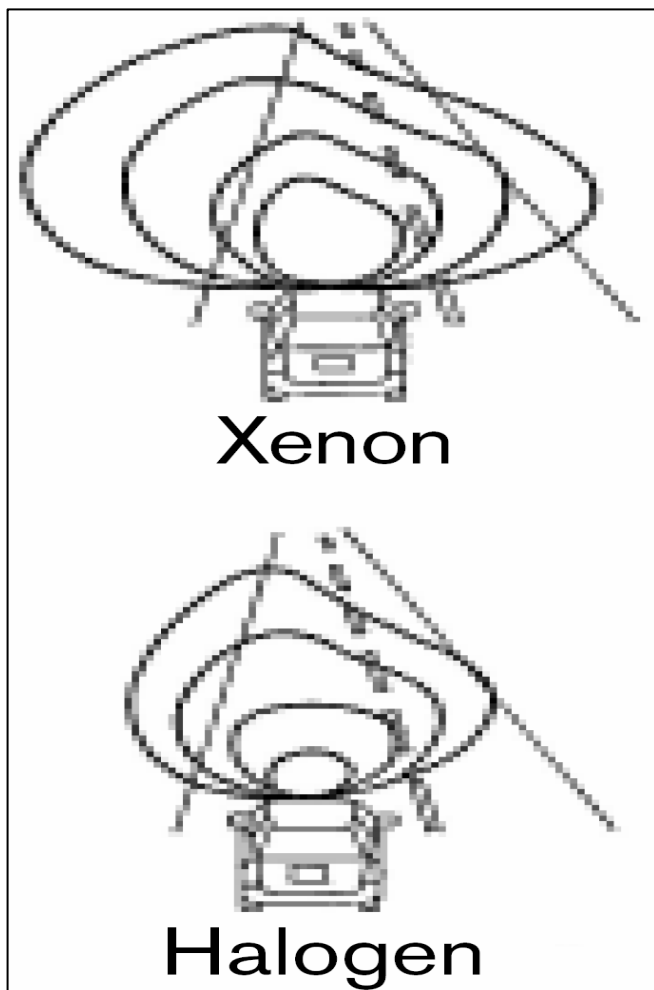
Failure of the globe

When the service life of the xenon bulb expires, the amount of light markedly decreases, the lamp flashes repeatedly and it emits a reddish colour.

NOTE:

If the lamp is turned on and off repeatedly the service life will be shortened.

Xenon type lights last longer when they are left illuminated.





K – LIGHTING SYSTEM

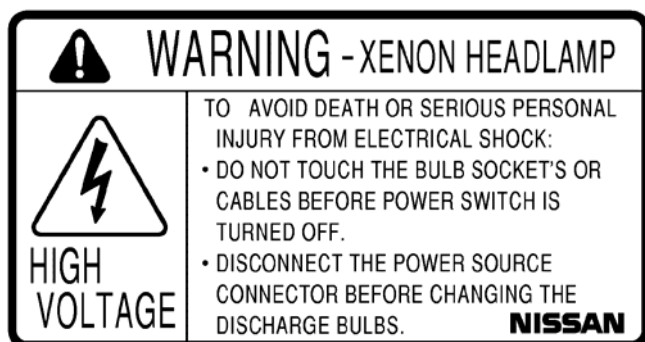
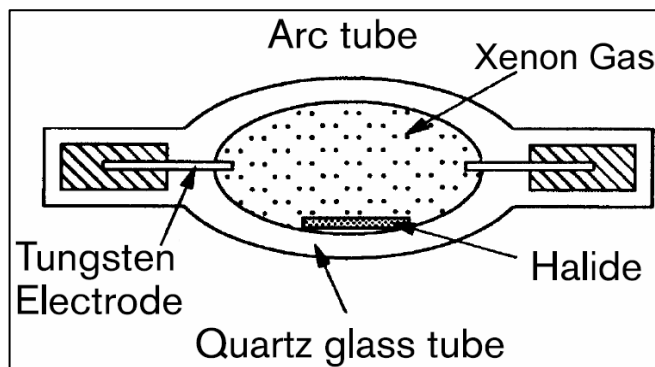
Xenon Headlamp Bulb

High-voltage pulses cause a discharge between the electrodes of the bulb.

The current between the electrodes activates the xenon gas and bluish white light is generated.

The temperature in the arc tube rises and the evaporated halide turns to white light.

Immediately after the lights are switched on, the brightness and the colour may slightly change until the bulb stabilises (approximately 10 seconds).



High Intensity Discharge Controller (Voltage Transformer)

Xenon headlights has a high voltage transformer (HID Controller) mounted externally on each headlight assembly.

The transformer unit receives normal battery voltage from the IPDM E/R & converts it into a higher voltage in order to operate the light.

A typical output from the Transformer to the globe is 85V.

EXTREME CAUTION MUST BE EXERCISED AT ALL TIMES WHEN WORKING WITH XENON LIGHTS. A PEAK OF 20,000VOLTS OR MORE IS POSSIBLE!





K – LIGHTING SYSTEM

General Precautions for Service Operations

- Never work with wet hands.
- Xenon headlamps are complete with a high voltage generating part. (HID Controller). Be sure to disconnect battery negative cable or power fuse before removing, installing, or touching the xenon headlamp (including lamp bulb).
- Turn the lighting switch OFF before disconnecting and connecting the connector.
- When turning the xenon headlamp on and while it is illuminated, never touch the harness, bulb, and socket of the headlamp. **These parts may contain up to 20,000V or more!**
- When checking the headlamp on/off operation, check it on vehicle and with the power connected to the vehicle-side connector.
- Do not touch the headlamp bulb glass surface with bare hands or allow oil or grease to get on it. Do not touch the headlamp bulb just after the headlamp is turned off, because it is very hot.
- Install the xenon headlamp bulb socket correctly. If it is installed improperly, high-voltage leak or corona discharge may occur that can melt the bulb, connector, and housing.
- Do not illuminate the xenon headlamp bulb out of the headlamp housing. **Doing so can cause fire and harm your eyes.**
- When the bulb has burned out, wrap it in a thick vinyl bag and discard. Do not break the bulb.
- Leaving the bulb removed from the headlamp housing for a long period of time can deteriorate the performance of the lens and reflector (dirt, clouding). Always prepare a new bulb and have it on hand when replacing the bulb.
- When adjusting the headlamp aiming, turn the aiming adjustment screw only in the tightening direction. (If it is necessary to loosen the screw, first fully loosen the screw, and then turn it in the tightening direction.)
- Do not use organic solvent (paint thinner or gasoline) to clean lamps and to remove old sealant.



K – LIGHTING SYSTEM

Low Beam

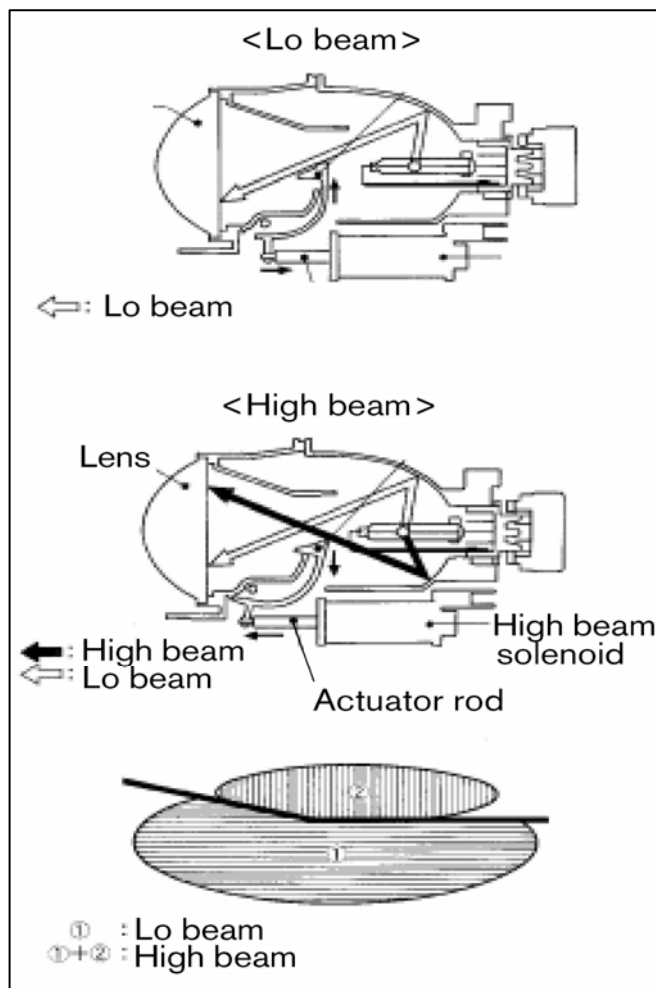
There is only 1 Light Globe in each of the Lamp Assemblies. Therefore the 1 globe is powerful enough to provide enough light for all circumstances. To give the effect of Low Beam, there is a small lamp shade inside the Lamp Assembly to shield away any light that may affect on coming traffic.

High Beam

To achieve the effect of High Beam, the lamp shade is attached to a solenoid unit. When the indicator lever is pushed forward to activate the High Beams, power is applied to the solenoid which in turn retracts & lifts the lamp shade. The light beam is allowed to spread out further to give "High Beam Lighting" when there is no on-coming traffic.

In conventional lights, typically an additional globe is illuminated when High Beam is switched on.

This is NOT the case with the Xenon lights in Z50.

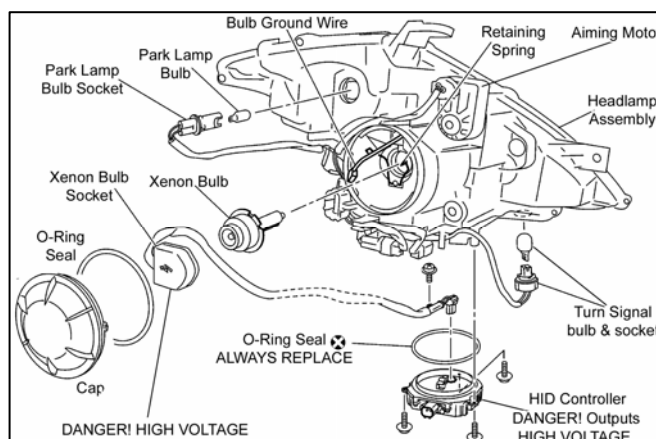


Lamp Assembly

The vertically stacked, multi-lens headlight assemblies house the main headlight globe (1 globe does both High & Low beams), turn signals and parking lights.

The HID Controller for the main Headlight Globe is also attached to the assembly.

In addition the Aiming Motor is also attached to the assembly as well.



K – LIGHTING SYSTEM

Headlamp Aiming Control

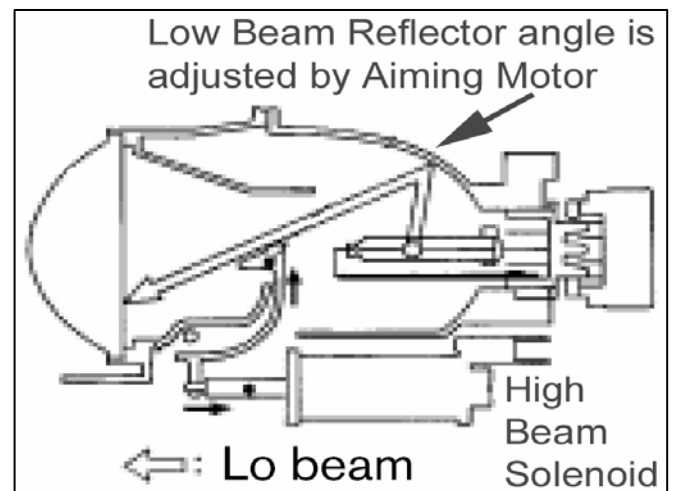
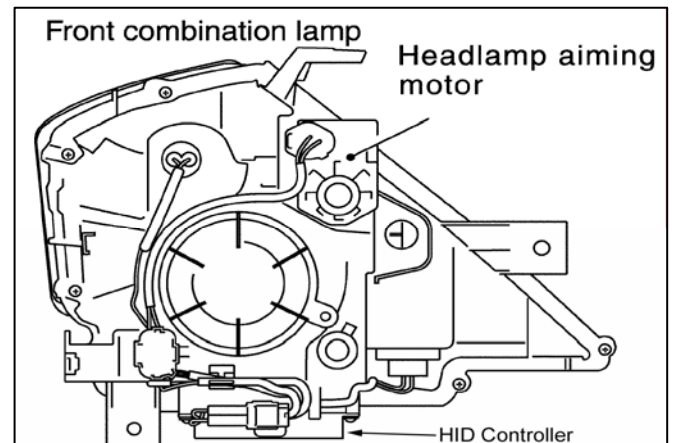
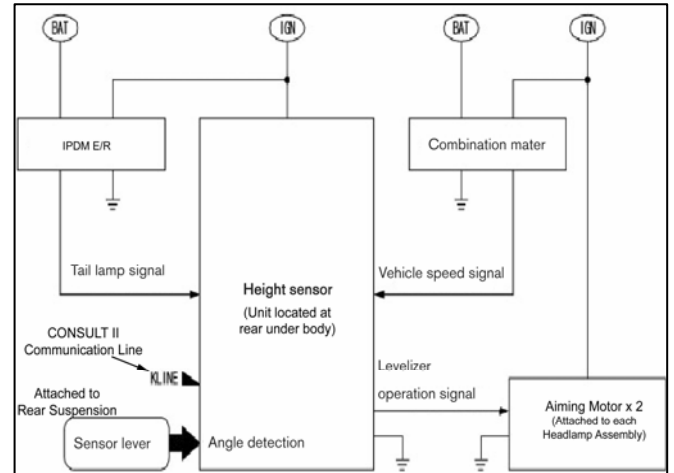
The Xenon lamp is very bright and if the headlamp adjustment is set too high, it will disturb other drivers.

The headlamp aiming control automatically compensates for the number of passengers and the weight of cargo in the trunk.

NOTE: This system operates SEPARATELY from the High Beam control system.

With the lighting switch in the 1ST or 2ND position (tailamps working), the height sensor mounted on the rear suspension detects change in the vehicle height and transmits a corresponding signal to the headlamp aiming motors. The signal drives the headlamp aiming motors, which adjusts the low beam reflectors of each headlamp to an angle appropriate for the vehicle height.

When the vehicle is stationary, the motors move the reflectors if the vehicle height changes to a certain height and this height will be maintained for a predetermined period. When the vehicle is running (excluded when accelerating / decelerating), the reflector angle is adjusted at predetermined intervals.



K – LIGHTING SYSTEM

Headlamp Aiming Control

The height sensor is located on the right side of the rear suspension member and detects vehicle height change by sensing the up / down movement of the suspension arm.

Even though the height sensor is continually reading the vehicle posture, it will only react to the vehicle posture position under the following conditions:

1. Ignition switch is ON
2. Lo beam switch is ON
3. Vehicle is stopped
4. Vehicle is driven at constant speed

The height sensor system does not operate while the vehicle is moving (except in situation 4) to prevent unnecessary adjustment because of excessive suspension movement. (Driving over a constantly undulating road etc.)

System Fault Indication

There is no specific warning light for the Headlamp Aiming Control System.

Therefore if the driver complains of a Headlight operation problem, please ensure you understand exactly what the driver is complaining of.

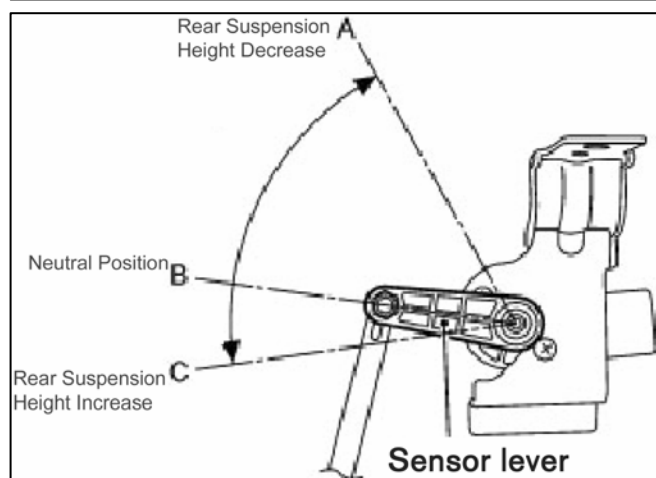
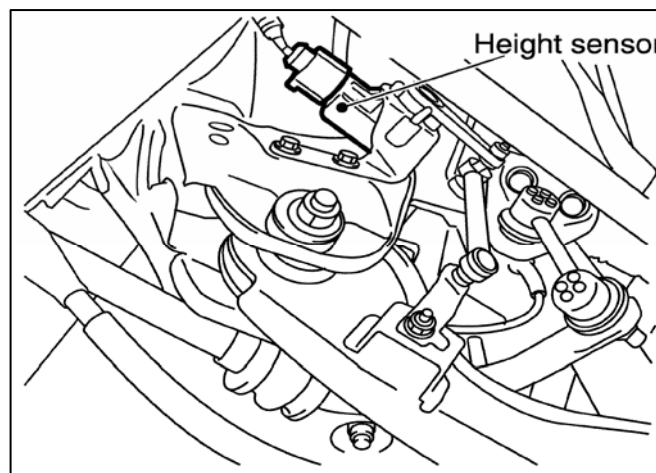
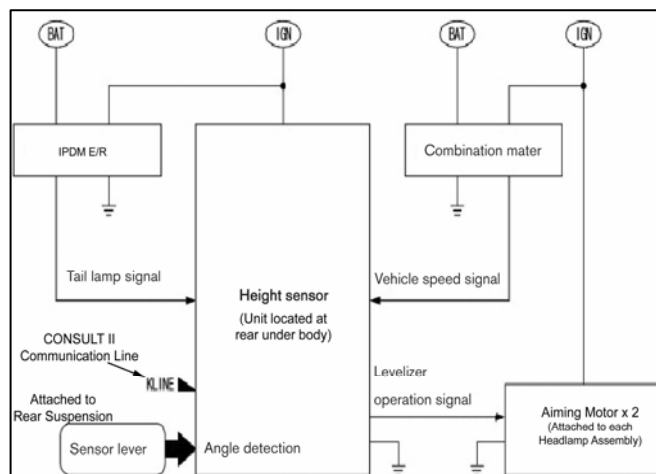
The complained of faults could be as follows;

1. Problems with the correct aim of the lights. They are too HIGH & the driver is being “flashed” by other motorists or they appear to be aimed to LOW.

- Manual Adjustment is incorrectly set.
- Aiming Motor failure.
- Improper operation of Height Sensor.
- Improper adjustment of Height Sensor.
- Suspension fault or modification interfering with Height Sensor operation.

2. Problems with Lighting Performance;

- Failed or nearly failed globe.
- Power Supply or Ground problem for the HID unit
- HIGH / LOW beam operation fault.
- Aiming problem with the lights. Set too LOW or too HIGH.
- Fault with Lamp assembly or reflector.



SENSOR IS TO BE INITIALIZED WITH CONSULT II WHEN A NEW ONE IS INSTALLED.

REFER TO SECTION K – LT OF THE SERVICE MANUAL FOR MORE DETAIL.